FOUNDRY

EST. 1902

TRADE JOURNAL

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VOL. III
No. 2347

NOVEMBER 30, 1961

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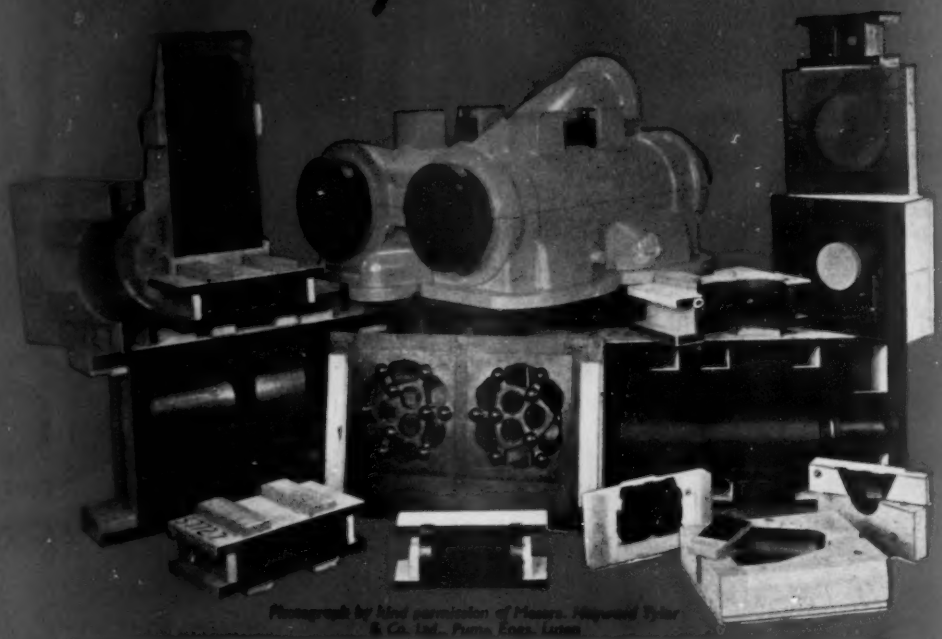

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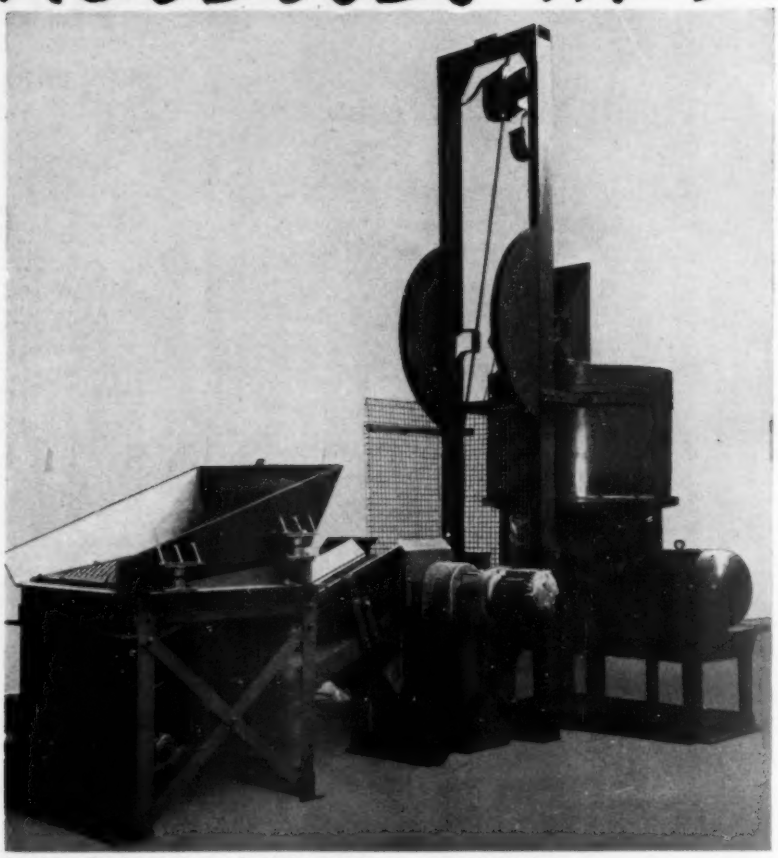

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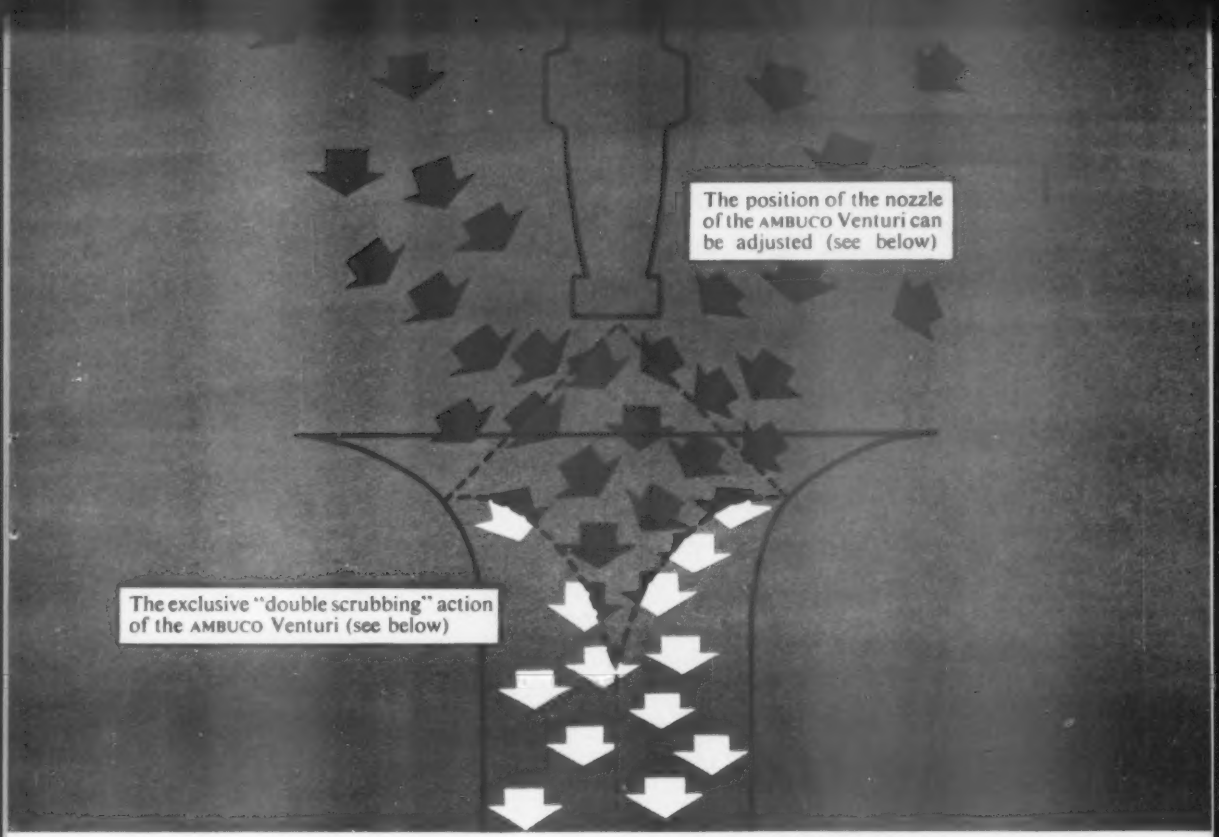
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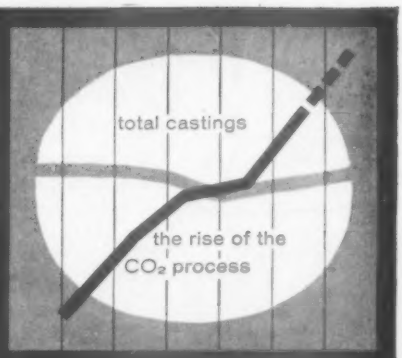

The simplicity of the CO_2 sodium silicate process is bringing important improvements to foundry productivity. For these reasons: A single type of sand is used for both cores and moulds. This cuts down mixing and testing. Stove drying is completely eliminated, saving cranage space and fuel. With no lengthy stoving and cooling, fewer mould boxes are needed and turn round is rapid. Bonding by CO_2 injection is done on the spot and takes only a few minutes. There is no sagging because of the excellent dry strength of the sand and sodium silicate mix, no distortion, because the bonding process is accurately controllable. This leads to fewer rejects, greater casting yield and much improved dimensional accuracy and finish. The whole process requires the simplest equipment and makes for better working conditions with reduced fumes and dust.

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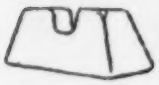
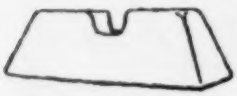


Ingots by Road . . .



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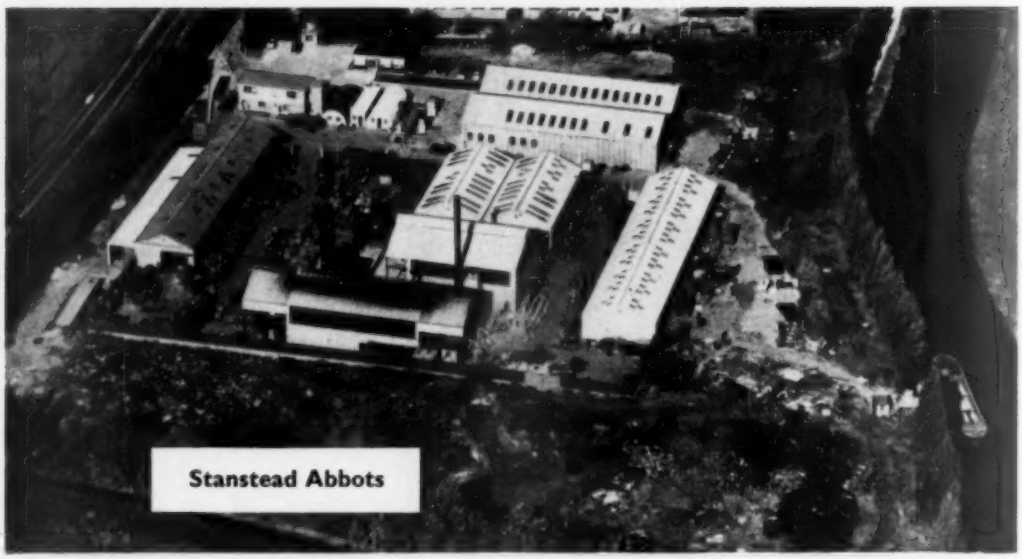

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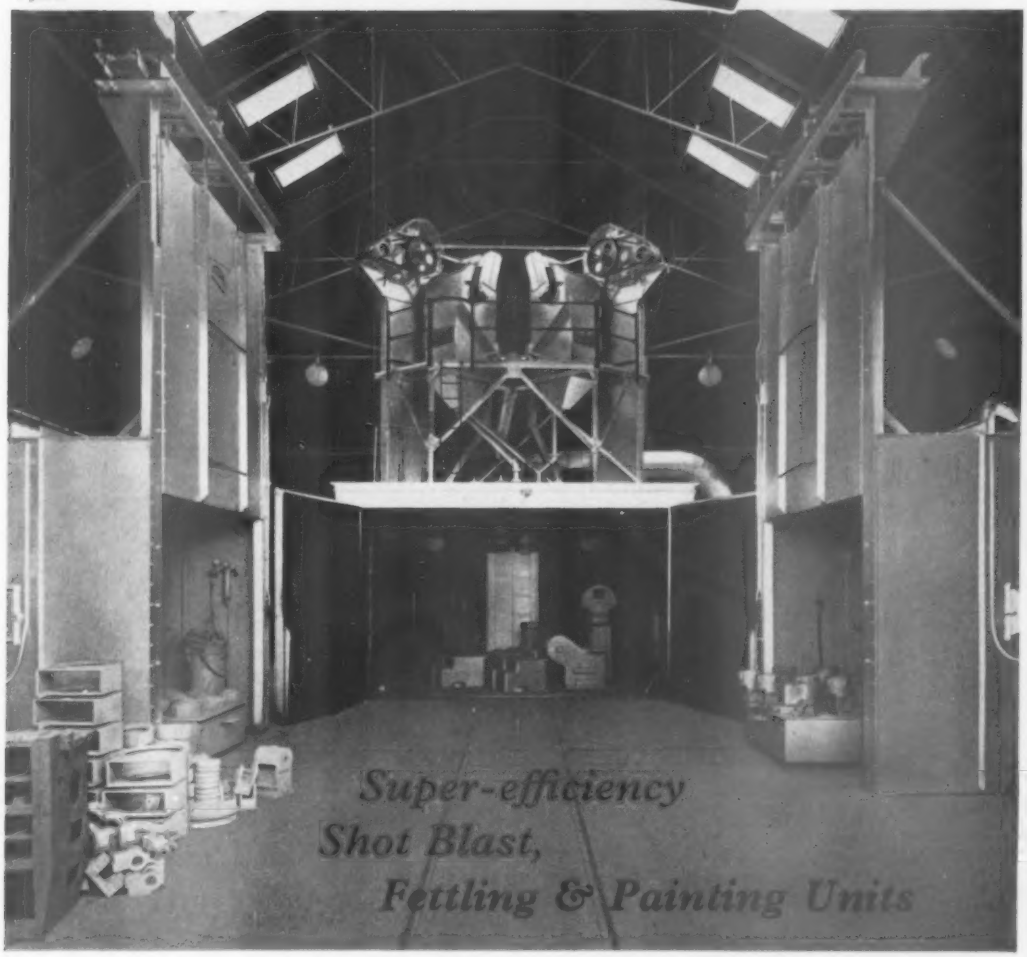

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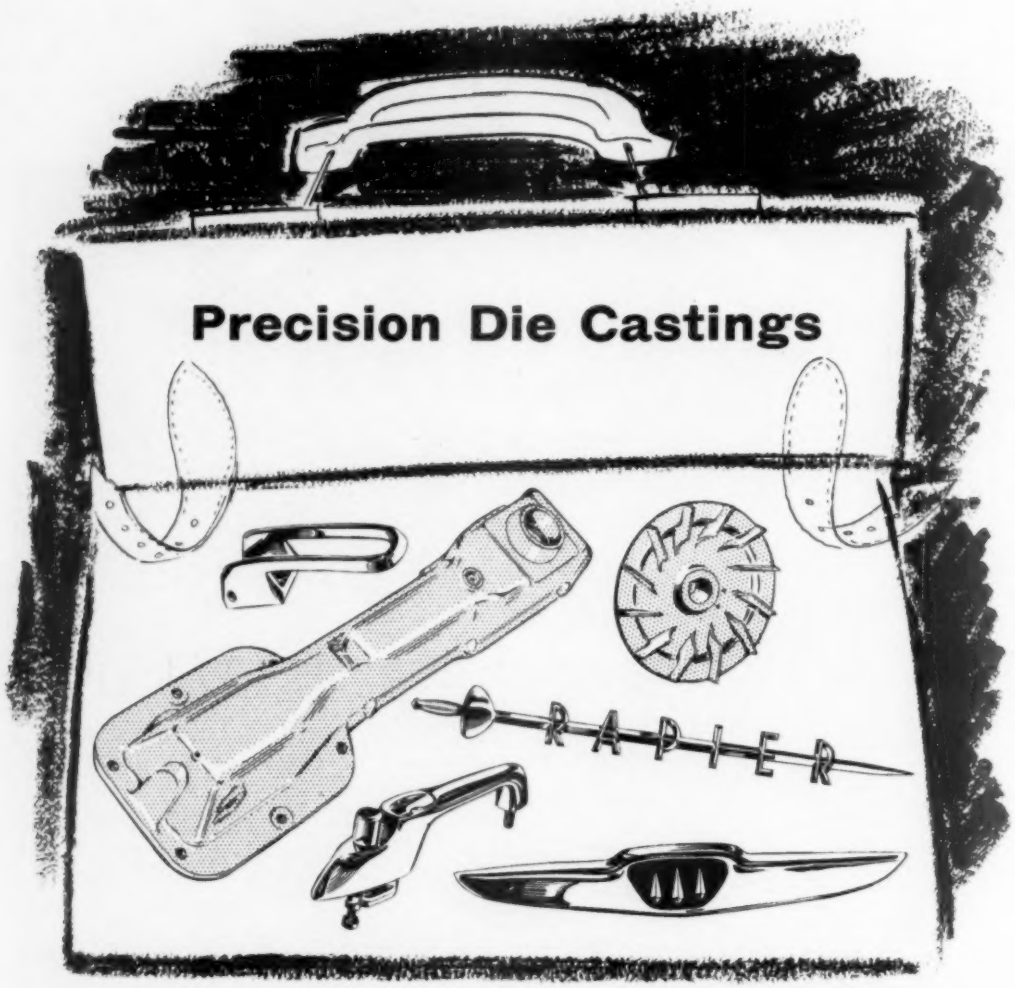

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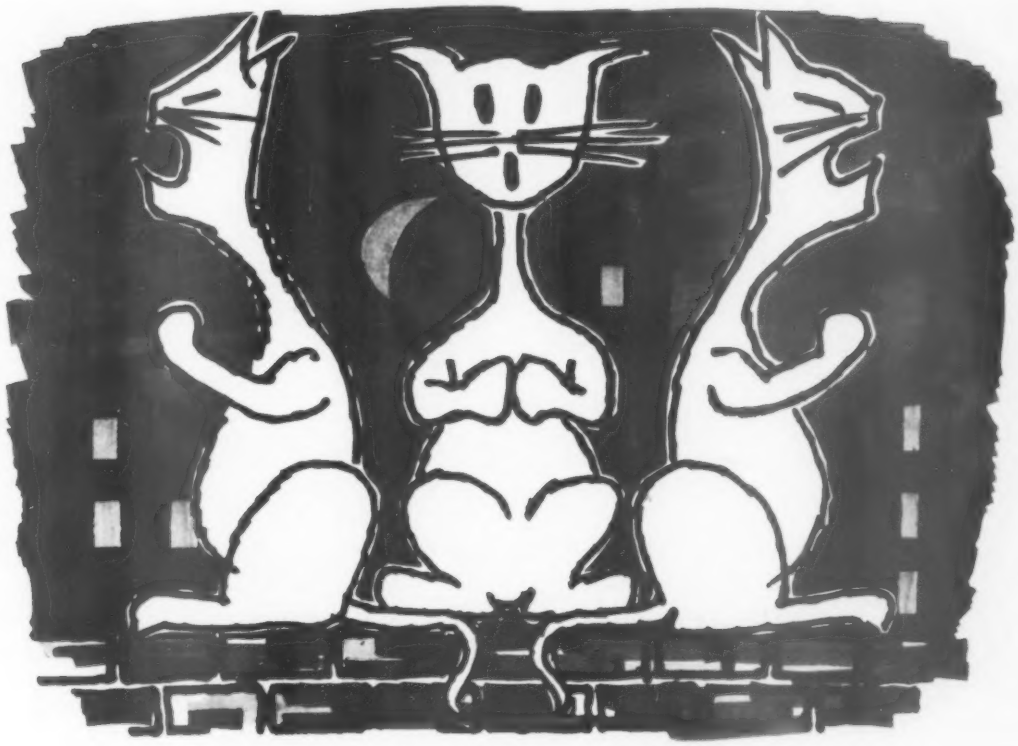

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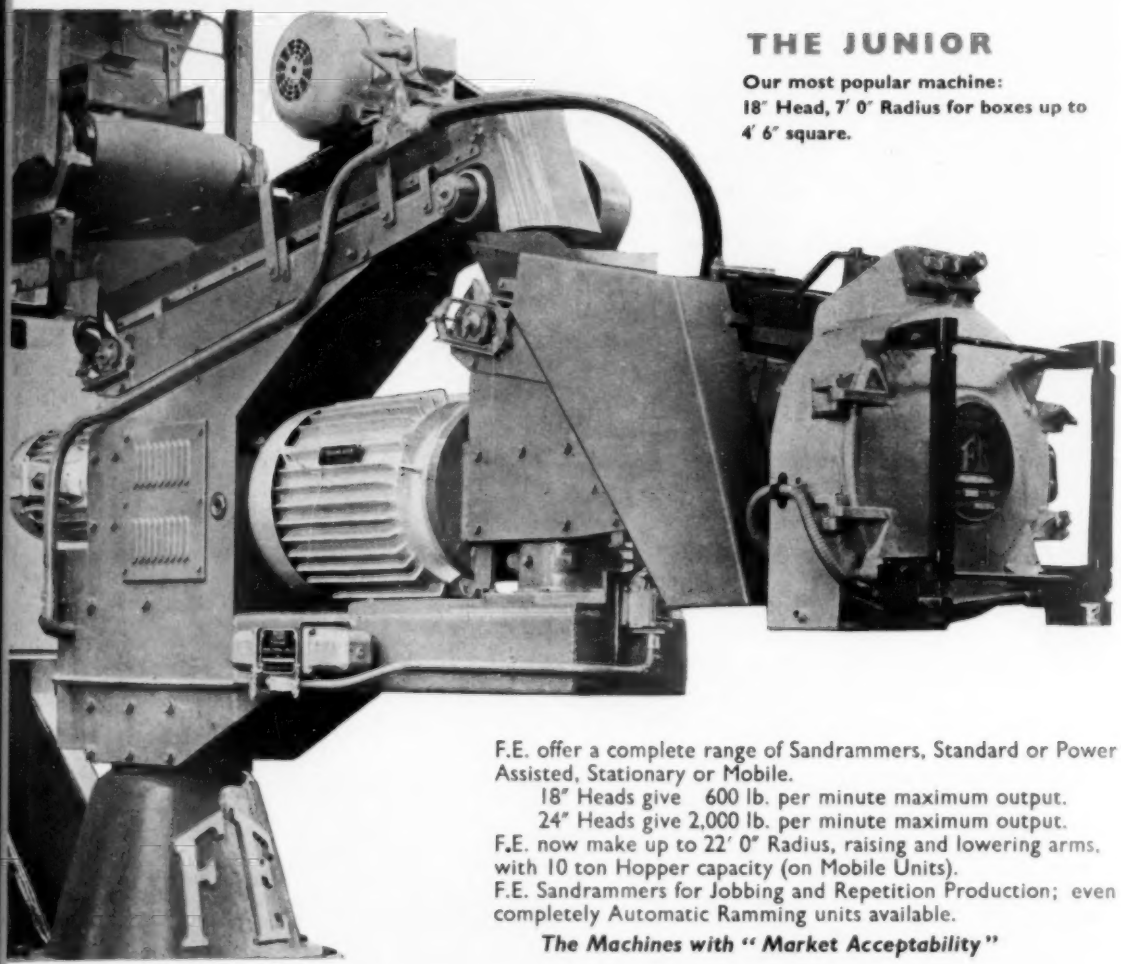

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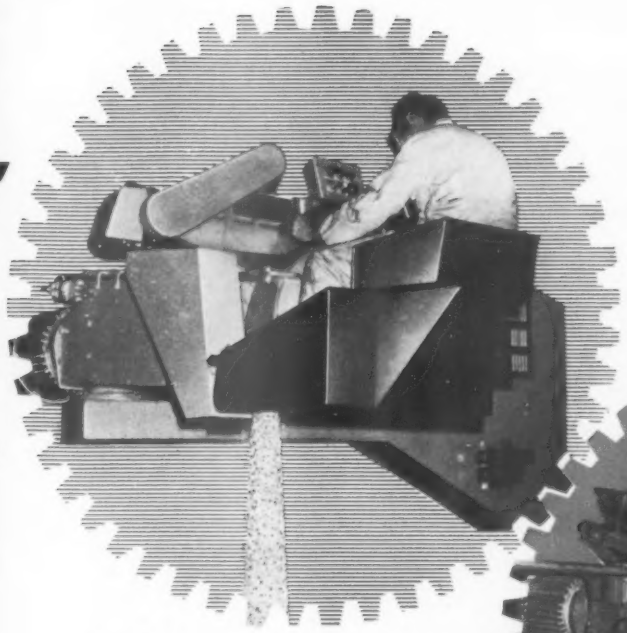
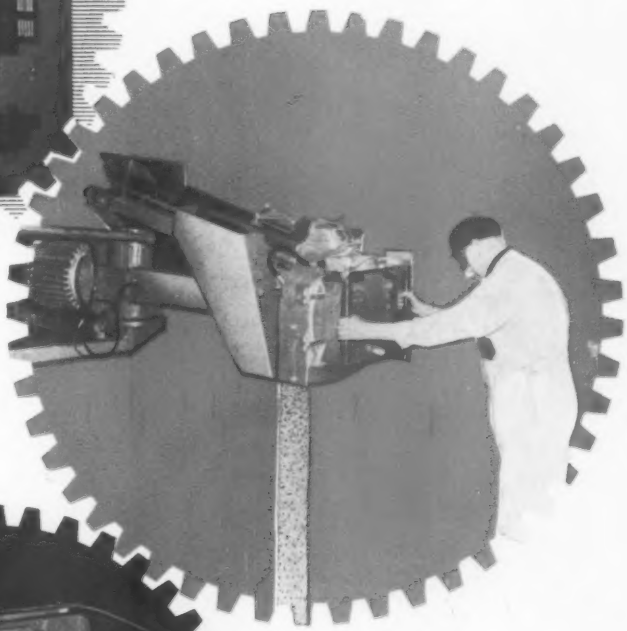


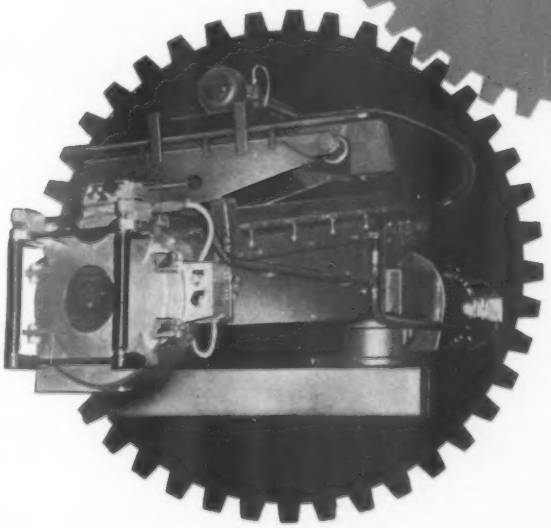
SENIOR No. 4

This is High Output Mobile Sandrammer, but Stationary model available: 24″ Head, 15′ 0″ Radius for boxes up to 10′ 0″ square.



SENIOR No. 1

The middle size machine, most suitable for jobbing work: 18″ Head, 10′ 0″ Radius for boxes up to 6′ 6″ square.



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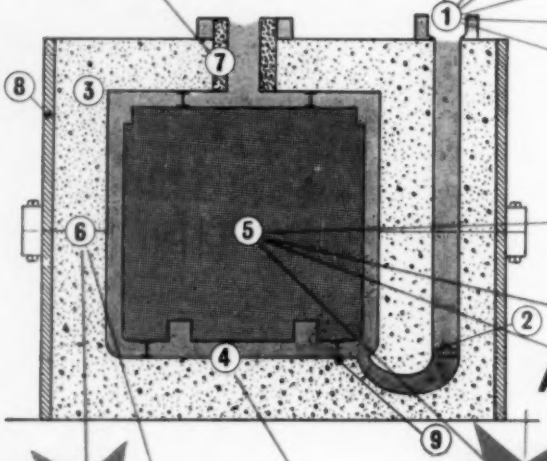

Key to Sectional Drawing of Mould

		Send for booklet No.
1	Metallurgical Control use of Fluxes	3
2	Clean Metal by using Ceramic Strainer Cores and Discs	4
3	Coal Dust additional to Facing and Backing Sand	1
4	Silverskin Blackings, Plumbago and Mould Dressings.	1
5	Cores using Crulin and Crudol Core Binders (Oil Bonded, Air Setting Cereal or CO.2 Binders).	2
6	Moulds Parted with Beecro Silica Free Parting Powder or Beecrol Parting Liquid.	1
7	Casting Feeding with Alsica Exothermic Feeder Heads.	4
8	Moulding Boxes supplied by B.F.U. Chaplets, Studs, etc.	5

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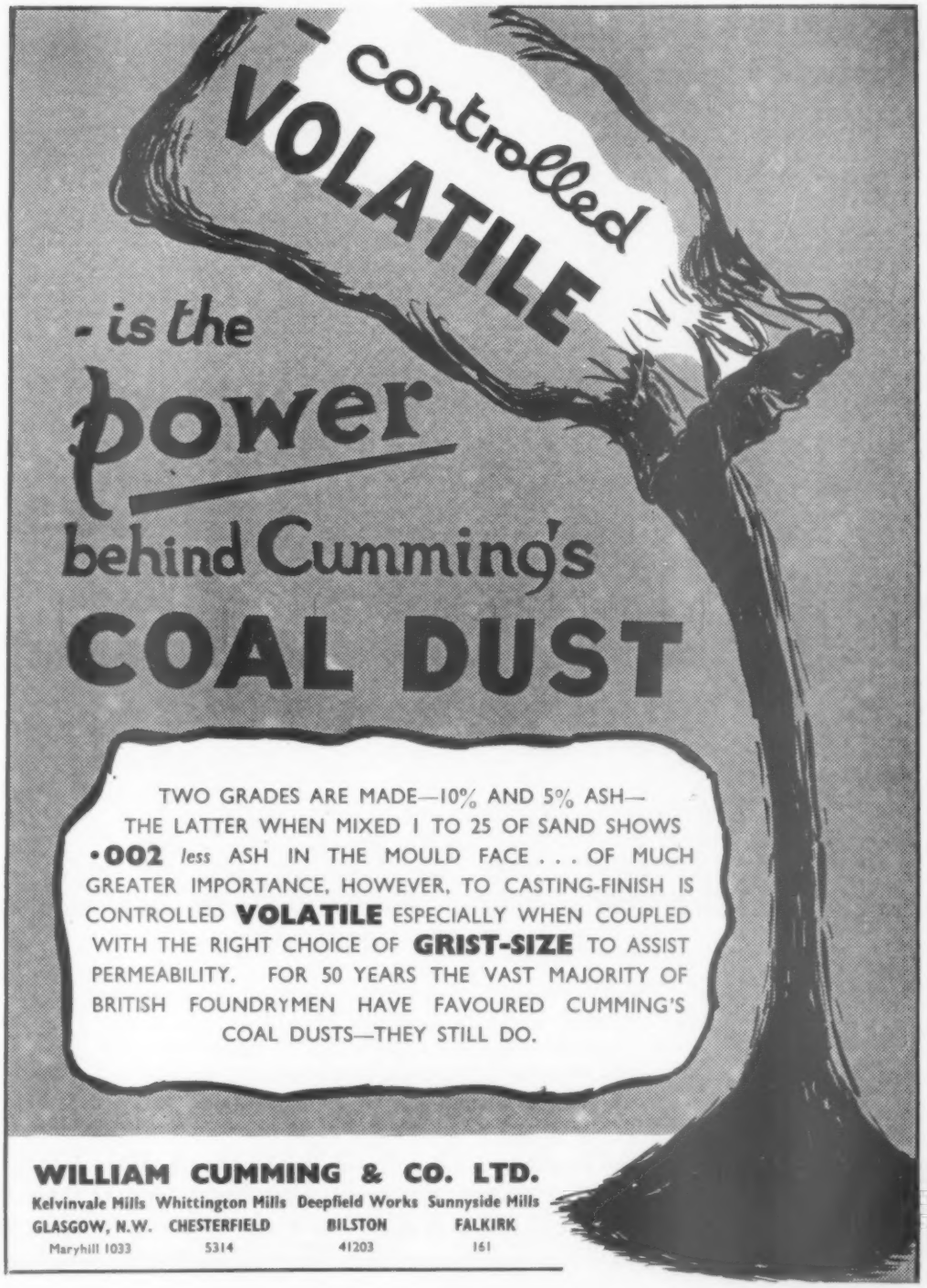
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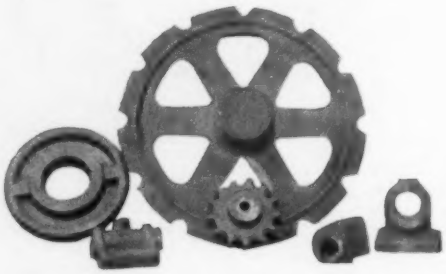

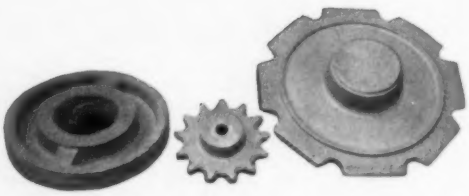

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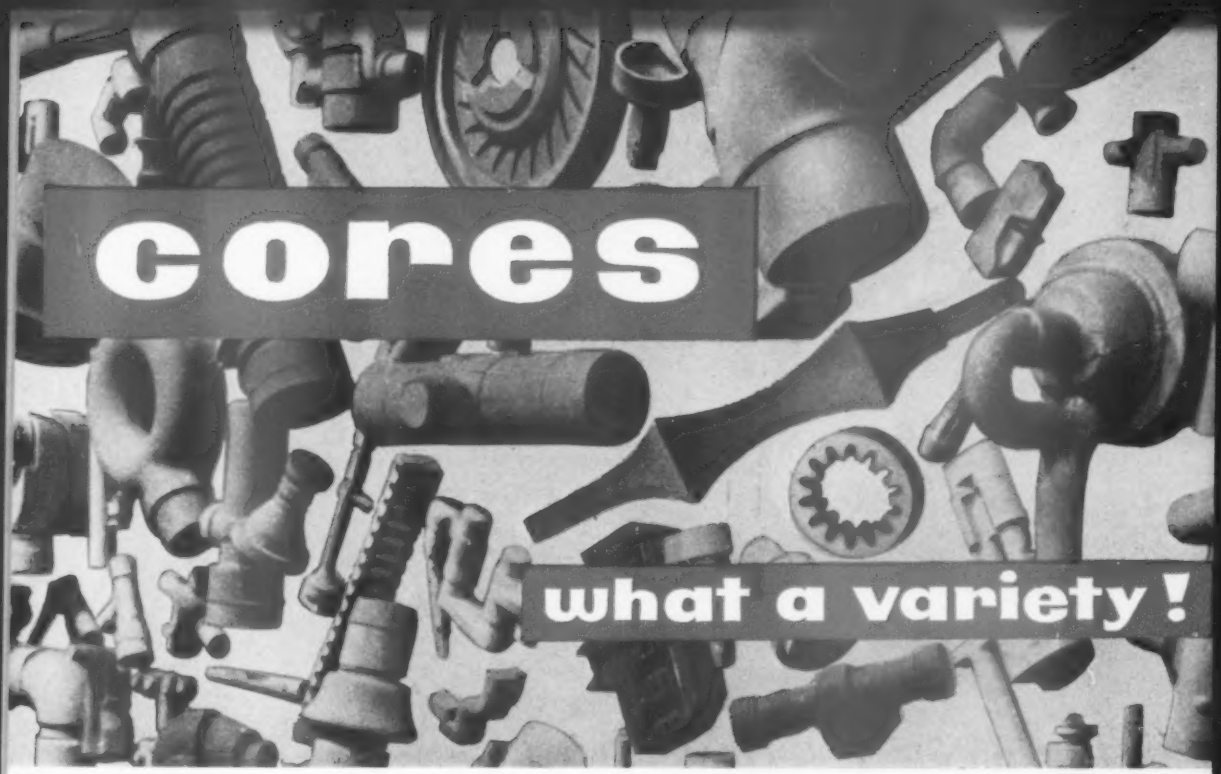

Introducing the

SHALCO

JUNIOR M.C.3
SHELL CORE BLOWER

shown in operation at the Nuffield Foundry, Wellingborough, of B.M.C. Ltd., by whose courtesy this photograph is reproduced.

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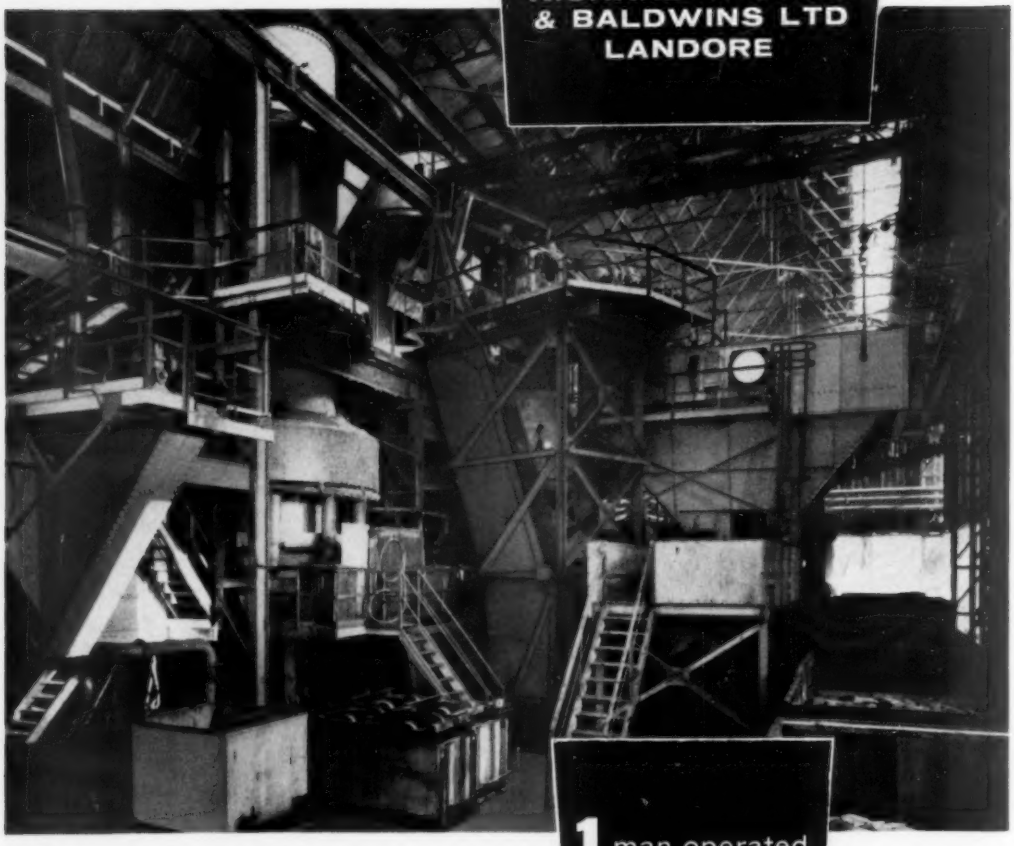

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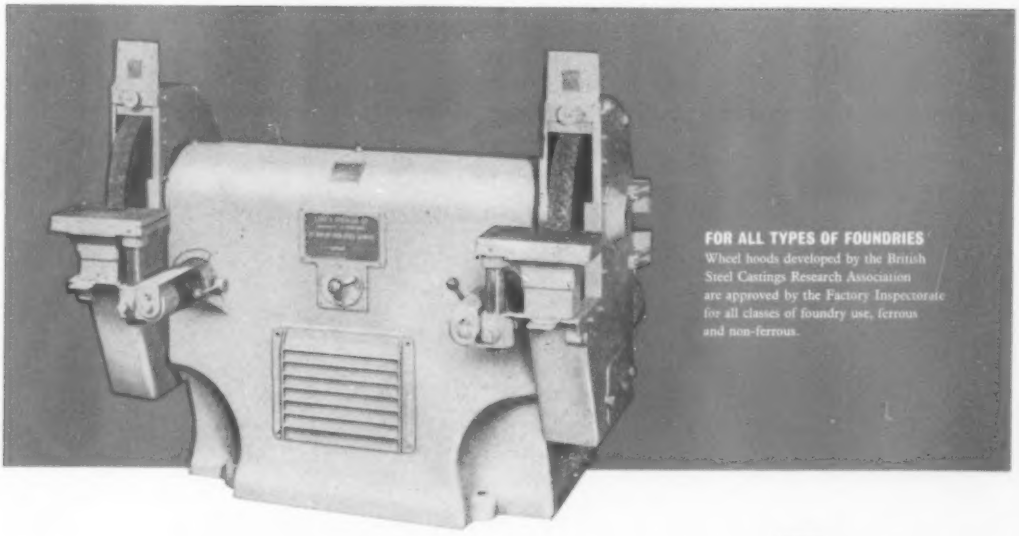

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Luke & Spencer manufacture a large range of pedestal and swing frame grinders which incorporate the latest developments in efficient dust extraction.
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These machines can be supplied with 16in. or 20in. diameter wheels on the type of grinder illustrated or 12in. and 14in. diameter wheels on models with the grinding wheel running parallel to the body of the operator.
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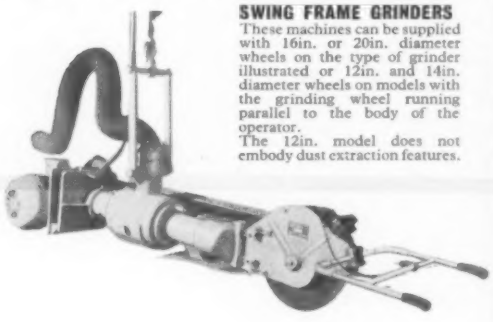

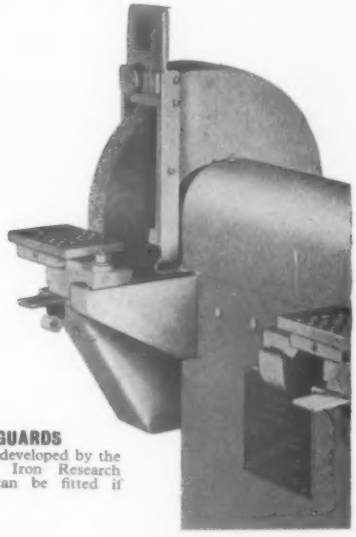

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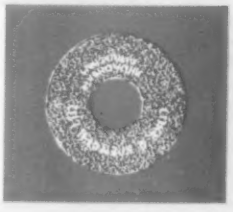

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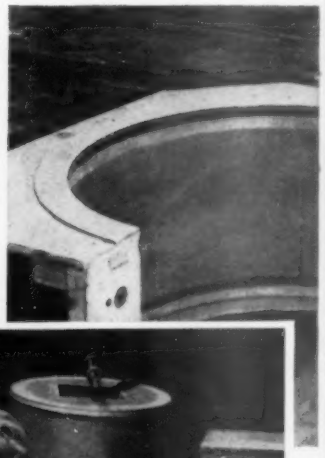

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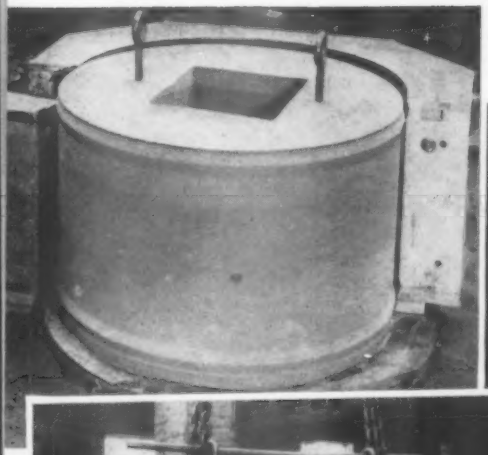

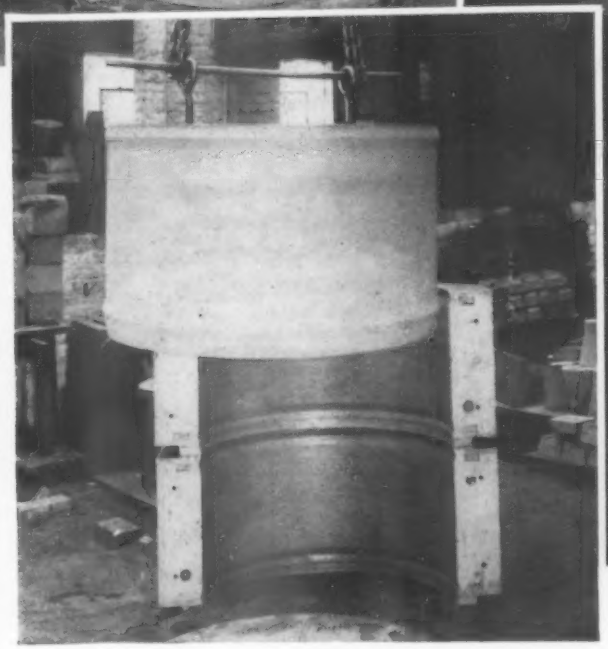

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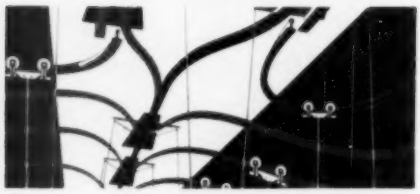

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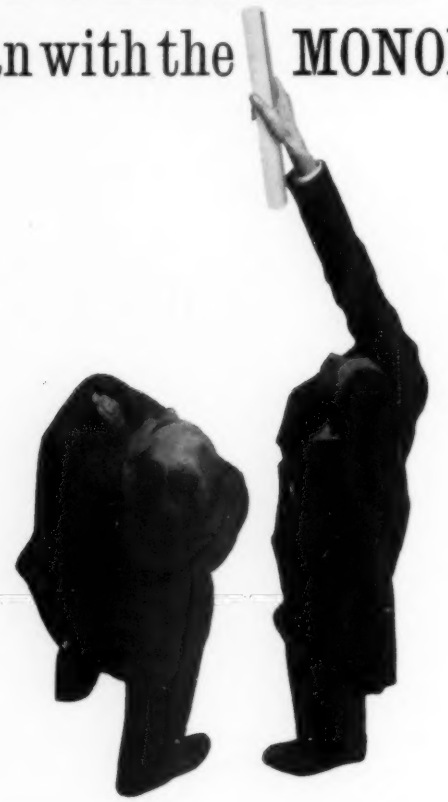

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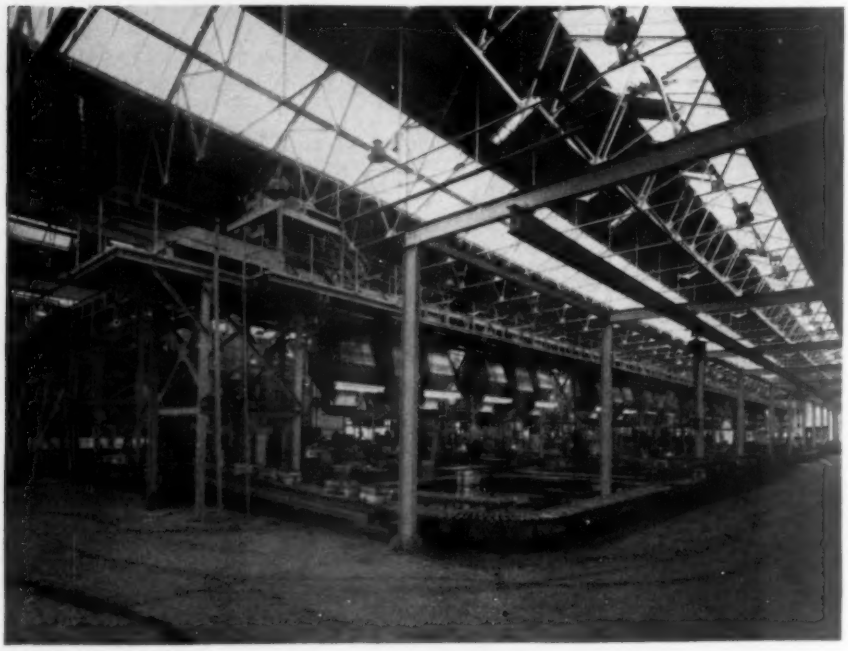

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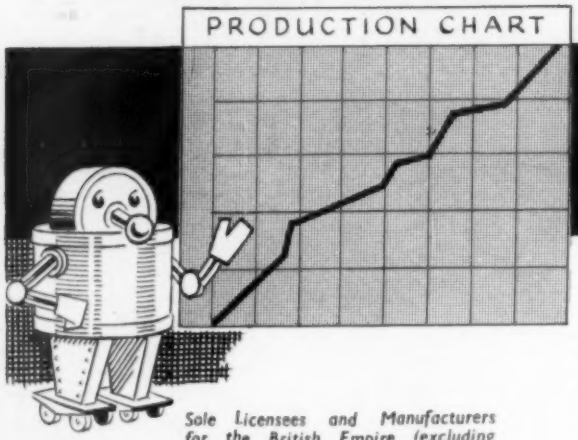

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FOUNDRY
TRADE JOURNAL
Vol. 111 November 30, 1961 No. 2347

A Worthwhile Award

An excellent opportunity exists at the moment for foundry firms to make a worthwhile award to youthful employees of outstanding merit and also to promote international understanding and friendship. This is consequent on an invitation by the technical training section of the *Syndicat Général des Fondeurs de France* for British foundry youth participation in the holiday camp which each year they organize in the South of France. It is run something on the lines of our own Outward Bound schools organization. The scheme has the co-operation of all member countries of the European Committee of Foundry Associations of which this country is an active member and of which in the near future it will provide the president.

In the past, only one or two young men from this country have been to the camp and both the hosts and our own employers' federations would like this number to be stepped up to between 20 and 25. We are assured that the camp is excellently organized and occupies 14 days. Those who are fortunate enough to participate will return with some knowledge of the French way of life, a few words of French and probably a desire to learn more. Firms which decide to go into the scheme should impress upon their youngsters that if they spend all their time with others of the British contingent they will miss much of the value of the trip—they must make an effort to associate with their hosts and the other foreign guests.

We understand that the total cost of the holiday is exactly £50 for each youth, but full details of the scheme are available from Mr. F. C. Hayes, training officer of the Council of Ironfoundry Associations, 14, Pall Mall, London, S.W.1. Once it becomes known in the foundries that such a holiday scheme is in operation for the best apprentice or apprentices, an increasing interest in their work should be evinced, to the benefit of everybody.

Students' Successes

A 22-year-old Grimsby day-release student, taking a five-year foundry course at the North Lindsey Technical College, Scunthorpe, had no examination scheduled this year, so he chose to sit for the City & Guilds Institute examination in patternmaking (ordinary level)—and passed with the highest marks in the country. The student is Mr. E. Blissett, an employee of the foundry and engineering firm of Harper, Phillips & Company, Limited. Next year, Mr. Blissett sits for his final foundry examination. For his prowess in the patternmaking examination, he qualifies for a P. H. Wilson prize of the Institute of British Foundrymen, worth £2 5s. . . . "to be spent on books or instruments."

It will be recalled that the country's most successful student in City & Guilds advanced level patternmaking is Mr. T. J. Washington—employed by Kent Alloys, Limited—he qualifies for the Tom Makemson Memorial Medal and Prize of the Institute.

A summary is given below of other IBF awards for City & Guilds students' successes in patternmaking and foundry practice, 1961:—

Buchanan Silver Medal: Foundry Practice (Advanced), Mr. S. P. Sharma (Birmingham).

Buchanan Prizes: Patternmaking (Advanced), Mr. J. W. Smart (Bristol); Mr. J. Weyham (Birmingham); Mr. A. D. Ewing (Glasgow); and Mr. A. J. Lansbury (Letchworth). *Foundry Practice (Advanced)*, Mr. D. Fairhurst (Bolton), and Mr. J. F. Donaldson (Burnbank).

P. H. Wilson Prizes: Patternmaking. The second prize is awarded to Mr. D. R. Bayliss (Coventry). *For Foundry Practice* Mr. A. A. Lacey (Bristol) receives first prize, and Mr. T. S. Vose (Workington) second prize.

Latest Foundry Statistics

Steel Castings. According to the *Bulletin* of monthly statistics, published jointly by the Iron and Steel Board and the British Iron and Steel Federation, the weekly average output of steel castings during September was estimated to be 5,700 tons; in August it was 4,200 tons, and in September, 1960, 6,400 tons. When a count was taken on September 9, the steel-founding industry was employing 18,510 people—100 more than on August 5 and an increase of 180 on the figure for September, 1960.

Ironfounding. The latest figures issued by the Council of Ironfoundry Associations show a decrease, during the past year, of 1,107 in the number of people employed in the UK ironfounding industry. At the week ending September 2, 1961, the total was 129,391, in the previous month it was 129,736 and in September, 1960, 130,598.

Bells in the News

A bell-ringing team of eight men completed 32,900 changes in 16 hr. 12 min. without stopping at Taylor's Loughborough bell foundry on Sunday, November 19. The team claim they exceeded the previous longest peal, at Loughborough, four years ago, by about 200 changes.

The Duke of Edinburgh will ring one of London's Bow bells on December 20, the first time for more than 20 years that the bells will have been rung. The bells have been recast by Whitechapel Bell Foundry and some of them were rehung in St. Mary-le-Bow, Cheapside, E.C., on November 21.

Forthcoming Events

DECEMBER 4

Institute of British Foundrymen

Lancashire branch: "Which Way to go?—Problems and Aspects of Foundry Technical Education," by C. Collier, 7 p.m., at the Midland Hotel, Manchester.

Sheffield and district branch: "Foundry Problems associated with the Manufacture of Iron Rolls," by R. Lee, 7 p.m., in the annexe of Sheffield College of Technology, Pond Street.

DECEMBER 5

Leeds Metallurgical Society

"Dislocations," by Prof. J. Nutting, 6.30 p.m., at the University Staff House, University Road, Leeds.

Institution of Production Engineers

Peterborough section: "Non-destructive Testing and Production Engineering," by J. F. Hinsley, 7.30 p.m., in the Conference Room at F. Perkins, Limited, Peterscourt. (Joint meeting with the Peterborough branch of Incorporated Plant Engineers).

Institute of British Foundrymen

Slough section: "Bells Ancient and Modern," by D. Hughes, 7.30 p.m., in the Lecture Theatre, High Duty Alloys, Limited, Buckingham Avenue.

DECEMBER 6

Institute of Vitreous Enamellers

Southern section: "Aspects of Electro-luminescent Enamels," by Dr. P. W. Ranby, 7.15 p.m., at the Constitutional Club, Northumberland Avenue, London, W.C.2.

Institution of Plant Engineers

Leicester branch: "Silicones in Engineering Applications," by G. B. Ingram, 7.30 p.m., at the Grand Hotel, Leicester.

Institution of Production Engineers

Western section: "Case Studies in the Application of Work-study," by G. R. Burn, 7.30 p.m., in the Small Lecture Theatre, University of Bristol, Queens Walk.

Manchester Metallurgical Society

"Newer Magnetic Materials," by K. Hoselitz, 6.30 p.m., at the headquarters of the Manchester Literary and Philosophical Society, George Street.

DECEMBER 7

Institute of Production Engineers

Coventry graduate section: "Problems associated with Export of Machine-tools," by C. E. Middlemiss, 7.30 p.m., at the Courtauld Lecture Theatre, Lockhurst Lane, Coventry.

Institute of British Foundrymen

Stoke-on-Trent section: "Running and Gating of Castings", by W. W. Glick, 7.30 p.m., at the Stipendiary Court Room, Hanley Town Hall.

Beds & Herts section: "Effective Casting through Work Incentive Schemes," by D. E. Austin, 7.30 p.m., at Bagshawe & Company, Limited, Dunstable, Beds.

East Midlands Metallurgical Society

"Metallurgy of Tungsten," by D. J. Jones, 7.30 p.m., in the Faculty of Applied Science, Clifton Boulevard, The University, Nottingham.

DECEMBER 7 to 8

Iron and Steel Institute and Institute of Metals

Powder Metallurgy Joint Group: Winter meeting at Church House, Great Smith Street, London, S.W.1.

DECEMBER 8

Institute of British Foundrymen

London branch: Dinner/dance, 6.30 for 7 p.m., at the Connaught Rooms, London, W.C.2.

DECEMBER 9

Institute of British Foundrymen

Scottish branch: "Metallurgical Problems Associated with a Jobbing Foundry," by Hal. London, 3 p.m., at the Royal College of Science and Technology, George Street, Glasgow.

Production and Manufacturing Control of Castings for Precision Machine-tools

*By F. Bacon, A.Met., A.I.M.**

A peculiarity of founding is that the limitations of the end-product are determined by the limitations of a number of distinct processes. The art of founding lies, in general, in the application of knowledge of these variants to an integrated process which reduces them to a minimum. On the other hand with precision machine-tool castings emphasis is on the more-exact control of the separate operations to achieve a high degree of quality in the finished casting. In this article the Author describes how this approach is applied to design, pattern-making, metallurgy, casting technique, moulding and coremaking. Great stress is given to close co-operation between the foundry and the machine-tool manufacturer.

Precision is a relative term and in this context a definition is essential. A precision machine-tool can here be defined as one which maintains its exactness throughout its useful working life. The machines in this category are machines in which exactness of movements of 0.0003 in. or less must be maintained. Jig-boring, hobbing, grinding and similar machines are typical examples, as are the larger instruments used for measurement in engineering metrology. Groups of precision machine tool castings are illustrated by Figs. 1 and 2. The problems facing a foundry which elects to manufacture machine-tool work of this nature must be thoroughly understood, or it will result in considerable economic loss for—(1) the foundry, from rejects, and, (2) the machine-tool manufacturer, from a waste of expensive machining time. Unfortunately for both parties defects will almost certainly not be shown until extensive machining has been done, by which time several castings may have been made.

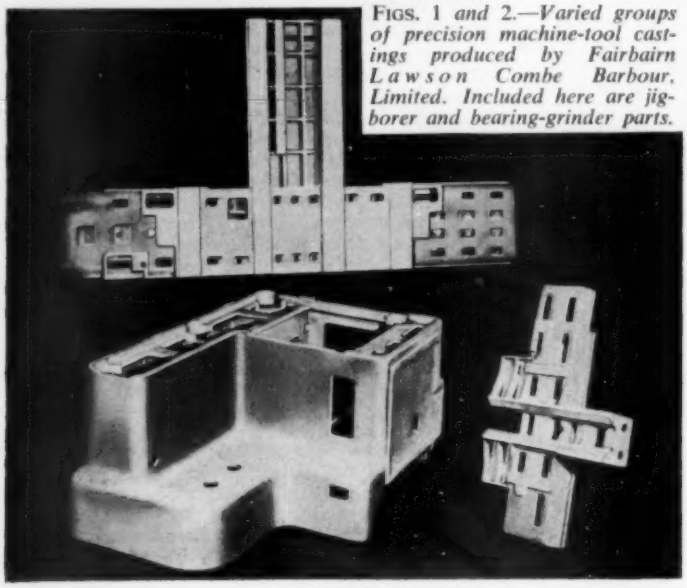
A machine tool manufacturer therefore, cannot afford to permit *any* foundry which has the capacity and is willing to supply at the right price, to manufacture important components. Conversely, a foundry should never attempt to manufacture machine-tool components without a detailed knowledge of what is expected in terms of quality. The quality factor in this instance being an exceedingly complicated one, not to be confused with quality as related to the general run of grey-iron castings. It follows, therefore, that the first essential in the production of precision machine-tool castings is a very-high degree of co-operation between the manufacturer and the foundry. The lack of this simple but important requirement is almost certainly responsible for more rejected castings, wasted machining time, broken delivery dates and bad relations than any other single factor. Co-operation must exist between the machine-tool designer, the chief inspector representing the machine-tool manufacturer and the foundry technicians—particularly the patternmaker and the metallurgist. The machine-tool component must be designed as a casting, and the casting must be cast as a machine-tool component. These two points are so often overlooked in the initial stages and the cause of prolonged argument later that they deserve elaboration.

* The Author is foundries manager, Fairbairn Lawson Combe Barbour, Limited.

Design for Casting

Primarily a machine-tool is designed to carry out a certain task for which its components must meet with definite physical requirements, and must, therefore, be made of certain materials of a minimum and maximum thickness of a definite shape. These basic requirements, when applied to a medium such as iron, inevitably result in modifications to give that compromise which permits manufacture as a casting to meet the most important of the designer's requirements, but yet not lower the efficiency of the machine-tool. Compromise means co-operation, it means appreciation of each others problems, it means avoiding a *post mortem* consultation after the casting is made, machined and then found to be defective. It means primarily an economic gain for all concerned.

The ideal design for a casting is one which gives a uniform section-thickness, avoids excessive intersections of ribs, bosses, etc., which create, in effect, a heavier section-thickness, and, as far as possible, eliminates dirt traps. These requirements are optima, but designers ought to keep them in mind. Where a thin section joins a thick section, a generous radius is essential, as a right-angle in high-duty metal will create a hot-spot with its attendant danger of shrinkage, or at least burn-on of sand, which will ruin cutting tools. If a thick section is necessary, in order to eliminate risk of shrinkage porosity the design should permit a feeder head to be located on the casting to feed it—and it should be noted that it is not possible to feed a 4-in. section through a 1-in. section. The interior ribbing and all cored-out sections should be designed so that a minimum of stress results as the casting cools. Stability is vital with machine tools and internal casting stress will appear later, when the casting will tend to



FIGS. 1 *and* 2.—*Varied groups of precision machine-tool castings produced by Fairbairn Lawson Combe Barbour, Limited. Included here are jig-borer and bearing-grinder parts.*

move after rough machining. A detail frequently overlooked is that the cores in a machine-tool casting may weigh more than the casting itself, and that these cores have to be removed. Even with the present-day advantages of good breakdown of core sands there must be ample provision for core removal. Provided a large panel-hole is permissible the designer should not provide a hole too small for the average man's hand to be inserted, nor where it is difficult to remove core-irons and sand. Ease of dressing operations also helps to reduce costs. The panel holes should, if possible be oval, not square. Square holes result in corner cracks due to casting stresses being concentrated at one point. These square holes are a source of trouble to the foundryman who meets it by rubbing a radius on the cores. This is self-defeating when making castings to close-tolerance dimensions, and core rubbing should be discouraged, before it becomes accepted practice. Perhaps square holes are the result of drawing-board practice, in which it is easier to draw straight than oval lines. The above are just a few of the points to note when designing for casting, all of which can be considered at the design stage. This is where co-operation and the appreciation of the other man's problems will result in concrete advantages later.

Foundry and Patternmaking

The co-operation being emphasized must extend to the design of the pattern equipment. The pattern equipment may not be made at the foundry where the casting is produced. The machine-tool manufacturer may have a patternshop of his own or prefer to utilize the facilities of an outside master patternmaker. Wherever the pattern is produced it is essential that it conforms to the manufacturing requirements of the foundry responsible for the final casting. If this procedure is not followed then many of the advantages of the design discussed under the previous heading will be nullified. A master patternmaker, if not instructed otherwise, will make the pattern with the simplest production method in mind, which with a machine-tool base frequently means that the slideways are in the top and the feet at the bottom as-moulded. This is fatal and will probably result in dirty slideways and since the slide is the item of primary concern to the machine-tool manufacturer, it usually means a rejected casting. A slideway in the top is a difficult job to chill to give the close metal-grain required, and this procedure, discussed later, is frequently essential. The patternmaker at the foundry has a detailed knowledge of the moulding and coremaking techniques which experience has established as good practice. He can advise on permissible dimensional tolerances and the necessary machining allowances. A small point which can result in a bad casting is the type of paint used on the pattern. An oil-bonded paint will be perfectly satisfactory for greensand moulding, but will give a bad draw due to severe adhesion of the sand, if the CO_2 Process is used. For this method where the sand binder, sodium silicate, is strongly alkaline, a cellulose paint is essential.

Taper allowances need consideration in relation

to different moulding and coremaking techniques. Generally speaking taper allowance should be more generous with equipment where the CO_2 Process and the air-setting techniques are used, than with greensand and conventional oil-bonded sand, where the plasticity of the mould or core results in "give" not characteristic of the former two. The patternmaker familiar with machine-tool work is well aware of when the moulder will be allowed to use chaplets and will design the core-boxes accordingly. The function of the pattern-maker is to make only such additions to the designer's drawing as are necessary to adapt it for casting purposes. This should result in pattern equipment which gives first-class castings if he is calculating with adequate experience of machine-tool requirements and with a detailed knowledge of his own foundry's technique.

Grain Structure

The metallurgical requirements of a precision machine-tool casting are precise, complicated and as will be demonstrated, frequently in opposition to each other in the same casting. These requirements must be thoroughly understood and discussed in detail with both the designer and the chief inspector before attempting to produce a casting. In precision machine-tool manufacture, that quality is related to the metallurgical details is without doubt the most important item of the whole manufacturing process. The order or the drawing may give a standard specification, calling perhaps for BS 1452 grade 17, but when dealing with various section thicknesses and the requirements of grained slideways this specification is not particularly precise. A high tensile-strength is necessary to resist deflection under load, and the calculations of the designer will indicate the minimum tensile requirements. A jig borer is designed to maintain a deflection of less than 0.0003 in. over lengths of 7 ft., under loads within the design capacity of the machine. All masses deflect under load and this maximum allowance for a jig borer demonstrates the importance of foundry technique and the metallurgical control when manufacturing castings for such a machine. The common grey-iron specification of "good cast iron" is completely inadequate for precision machine-tool slides. An extremely close-grained iron with a structure approaching steel is necessary to give the wear resistance to ensure the long life and maintained accuracy of the slideways. This term "close grain" must be given detailed investigation by the foundry concerned. What is usually regarded as close-grained iron may be rejected out of hand as "open grain" by the chief inspector of the machine-tool manufacturer. He wants the ultimate in close grain and for a very good reason. Fine dirt will collect in the cavities of an open-grained iron, in the interstices around coarse graphite flakes, and this dirt then acts as an abrasive which results in wear and loss of accuracy. The slide will be covered with fine hair-like scratches which in turn will collect dirt and loss of accuracy will occur at an increasing rate. With severe open grain the effect of this accumulation of dirt may even result in seizure of the slide. The wear resistance associated with the close grain can be related to the hardness to a considerable degree. For precision machine-tools a Brinell hardness of 200 on the slideways is desirable and is sometimes specified.

Opposing Factors

Some of the opposing metallurgical factors will now have become evident. The slideway is normally the heaviest section on the casting where close grain and a relatively-high hardness are essential requirements. The designer will wish to keep the weight of the components as low as possible but thinner sections must also be machinable. It is perfectly normal to be dealing with a casting with 2½-in. section slideways where close grain and 200 Brinell hardness are essential, and other sections of ¼-in. or less where machining will be necessary. A high-tensile metal of pearlitic matrix, fine graphite and low phosphorus content is one of low fluidity, short "life" and high liquid-shrinkage, more prone to misrunning, cold laps and gas holes than an ordinary grey iron. Co-operation with the machine-tool designer will assist but only to a limited extent. Uniform section is obviously impracticable, but it may be possible to lighten-out slideways by internal coring; machining pads will increase section thicknesses at chosen places, whereas an extra ¼-in. on wall thicknesses may be significant metallurgically.

The foregoing will have indicated the perhaps-complicated requirements of precision machine-tool castings, where frequently there is opposition between what is ideally suitable to the designer and what would be ideal to the foundry. The opposing factors must be considered reasonably and in detail. Co-operation between the designer, chief inspector, metallurgist, patternmaker, moulder and coremaker can and does at the design stage, result in a design which will give the compromise nearest to these several requirements. This design will have reduced the foundry risk of rejects and the machine-tool manufacturer's risk of wasted machining time and broken delivery dates. The finished casting will still be expected to meet the designer and chief inspector's major requirements, and so far as the foundry is concerned the casting will still need attention to detail through all the foundry stages. This can be more conveniently explained under separate headings.

Patternmaking

The co-operation between the patternmaker and designer has been emphasized. This is important and will bear repetition, for without it the technical and practical points following may well be of little value in the production of a first-class casting. The majority of machine-tool patterns, for reasons of economy, are made in yellow pine. The thickness of timber used being determined by detailed consideration of each individual pattern. For some of the larger headstocks, saddles and similar castings it may be advisable to construct from mahogany, particularly if quantity production is envisaged. Withdrawal of such patterns from the mould necessarily involves some rough handling with consequent stress, and the relatively-weaker yellow-pine

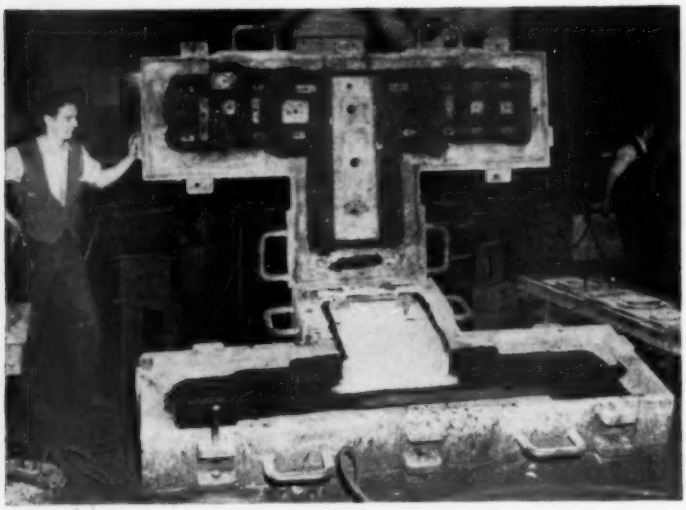


FIG. 3.—*Cope and drag parts of the mould for a jig-borer cross slide. The CO_2 Process was used in this instance for the mould production.*

construction may well be permanently disturbed, with disastrous results to future castings. Patterns for long castings should be made of timber of a reasonable thickness with a number of adequate stays. When a number of stays are to be constructed it is advisable to make a jig to ensure that the stays are identical dimensionally, with the correct allowance of taper to give a good draw from the sand mould. By using the jig technique the body of the pattern when screwed together should only require sanding to guarantee accurate dimensions. Important slideways must be made to cast on the bottom face, never the top face. Loose parts such as facings and seatings on the side of the casting, as-cast, are better either pegged or dovetailed on. Screws tend to result in lost dimensions when the pattern has been used a few times. In some cases the contours of these loose pieces are such that a core will save considerable finishing time by the moulder.

In the past it was customary to put a camber allowance on the pattern but this is not current practice. The differing moulding techniques and varying grades of metal used has more or less taken this calculation out of the patternmaker's control. The camber allowance is best left to the foundry concerned. Records of similar castings, plus the detailed knowledge of what to expect from their particular moulding and metallurgical techniques should permit the foundry to be reasonably precise and camber the bed of the mould accordingly. Core boxes must be related to the core-making process used when aiming for a high degree of dimensional accuracy. There is a significant difference between allowances for conventional oilsand cores and those made using the CO_2 or air-setting oil Processes. All equipment should be coded to identify core locations, marked-up to show metal thicknesses and colour coded to show machined faces. If this is done carefully the moulder should not need a drawing, nor need the services of a patternmaker at the moulding stage. Damage in storage must be considered and to minimize this it may be preferable to construct the larger patterns in sections which are easier to transport and store when not required in the foundry.

Metallurgical Control

Without first-class metal it is impossible to make a satisfactory precision machine-tool casting. The skills of the designer, patternmaker, moulder and coremaker are useless unless the metal poured into the mould not only makes a solid casting of the required shape, but gives the mechanical and physical properties essential for the particular component. This means that metal control must be very strictly maintained. It is pointless to attempt to make precision machine-tool castings on the basis of one analysis per week and indifferent metal control. Metal control starts with the careful selection and control of all incoming raw materials and the conscientious segregation of scrap into various metal grades within the foundry itself. This is best done by colour coding which is convenient for unskilled labour and simple to check. All raw materials must be weighed into the cupola, and air-volume and pressure controlled within fairly-tight limits. Metal mixes can then be based on the composition obtained considering the daily analysis records. Adjustments to the metal mix can be made when a trend is shown, before a set range value is exceeded. By adopting an empirical procedure based on collected records, a consistent composition can be obtained and metal grades varied as required. To operate this procedure a knowledgeable metallurgical staff and a fairly well-equipped laboratory are essential. The laboratory staff, apart from analytical and general laboratory duties, must operate the metal-control procedure on the shop floor and ensure that the correct grade of metal goes into the right casting. The metallurgist has a fairly complicated problem to solve to meet the opposing factors of tensile strength, close grain in thick sections and machinability in thin sections. He is also responsible for ensuring that the metal melted, even if of high grade, *e.g.* BS 1452 grade 23, is hot enough and fluid enough to run the particular casting, and is not prone to cracking on cooling due to oxide inclusions or other metallurgical defects. Any tests which can be performed before the casting is poured and which will either permit adjustment if slightly out of balance or will

definitely justify a decision not to pour, are of immense value to the foundry. The solving of the problem of close grain on the slideways and good machinability elsewhere is a difficult one. If the casting is of reasonably-uniform section, and most machine-tool castings unfortunately are not, then it is possible to meet these requirements by adjusting the composition of the metal without using chills or denseners. In this case the machinability on thin sections will not be too good if a hardness of 200 Brinell is given on the slideways.

Densening and Chilling

Claims are frequently made that it is possible to make all precision machine-tool castings satisfactorily without the use of chills or denseners. This appears to be a very optimistic claim and is likely to result in the chief inspector being most dissatisfied with the closeness of the grain, or if the grain closeness is satisfactory, in a casting so hard to machine on thinner sections that the economics of the machine-shop are unfavourably affected. The damping capacity of the casting would also be less, and this quality is beneficial in machine-tool castings, where any vibration will oppose absolute precision. It is logical to state that providing the casting meets the mechanical requirements in terms of tensile strength, it is an advantage on thick section slideways, to use chills or denseners to give the specified hardness plus close grain on the wearing surface, yet provide good machinability on other sections and maintain as high a damping capacity as possible. The close grain and surface hardness on the slide can be obtained by either iron chills or silicon-carbide denseners, depending on the section concerned. It is the responsibility of the metallurgist to investigate the metal sections and with the particular grade of metal used decide whether to densen or chill. He is responsible for deciding on the grade of metal to be used, to be at least to the minimum tensile strength specified during the design discussions. He is responsible for maintaining consistent cupola control and ensuring that the metal is satisfactory before the casting is poured. He must also record the composition of the iron used for each particular casting, and compile the relevant records of progress, and relate these to the final report from the chief inspector of the machine-tool manufacturer. Furthermore if the casting is satisfactory, he is expected to duplicate the procedure exactly, the next time a casting is made.

Moulding and Coremaking

When dimensional tolerances have been agreed upon and fixed by the patternmaker it is important to ensure that no alterations are made as a consequence of pattern rapping, core sag, or core rubbing. Experience in the Author's foundry has proved that first-class dimensional tolerance can be obtained by use of a combination of the Carbon-dioxide Process and the air-setting oil technique. Drysand moulding can result in lost tolerances due to finishing-off a mould, or as a result of drying, when mould cracks can occur. Dimensions are lost when patching up. A drysand moulding mix is difficult to control, particularly the clay and moisture contents, and defects such as scabs, buckles and swells can result. These defects are extremely rare when using the Carbon-dioxide Process. The nature of precision machine-tool casting makes it certain that the cores are intricate. Here judicious use of either the Carbon-dioxide Process or the air-setting oil technique ensures that cores are true to the corebox and will not alter in shape due to sagging whilst in the green state, as can occur with oilsand cores. An added advantage with these two techniques is that no grates are necessary and a minimum of irons need be used. This is an immense advantage at the de-coring stage. Cores frequently have to be taken out *via* a small hole, from which it would be impossible to remove a grate without breaking it up first—a hazardous operation when dealing with a thin-walled casting. Suitable mould coatings have been developed to give a first-class surface finish with Carbon-dioxide Process moulds and cores (Fig. 3), and breakdown agents can be added if necessary for the particular casting being made. To ensure a good clean casting the moulder's work must be meticulous (Fig. 4). At the Author's foundry, all ingates, runner bars, and sprues are supplied to the moulder with the pattern equipment and rammed up in the mould. Specially-designed risers are also rammed up. No cutting of a mould surface is permitted, such methods are an immediate cause of dirty castings. The ingates, runners and feeder heads are calculated on the basis of the section thickness, weight and shape of the casting. Fast pouring may be essential because of thin metal-sections and a high-tensile iron, or perhaps delicate coring justifies slow pouring. Every precaution is taken to prevent the entry of dirt with the metal, by thoroughly skimming the ladle, which is well prepared beforehand, and a good deep pouring basin as carefully made as the mould. A greensand basin is not suitable, whereas a basin made in CO_2-sand is ideal. The basin is fitted with stoppers which are drawn when the basin is full, and the basin is kept full to prevent slag being sucked into the casting. These simple precautions are just as important as the preparation of the mould. For thin-walled castings or castings with a flat top it is normal practice to run iron through, to give a flush of hot metal on the top face. This minimizes risk of a cold-lapped surface and avoids the occurence of gas holes on the finished casting which can become a characteristic defect with high-duty metal if suitable precautions are not taken.

Conclusion

The procedure described which amounts to a full knowledge of the requirements initially, and attention to detail at all manufacturing stages is essential if consistently satisfactory precision machine-tool castings are to be made. The operations in the foundry must be devised on a scientific basis far removed from techniques normally associated with orthodox grey-iron moulding. A finished casting from the foundry is not the end

FIG. 4.—*Setting a core in the mould of a bearing-grinder base produced for Newall Engineering Company, Limited.*

of the process. Continuous contact must be maintained with the chief inspector of the machine-tool manufacturer. Information in respect of grain-size, hardness, machining defects and any other property where improvement may be effected must be obtained—with, if possible, marked up drawings or, better still, photographs which which illustrate any defects and show their location. A bad casting is not necessarily a reject, but more important a good casting can always be improved upon, if sufficient factual knowledge is available, and such knowledge used to the maximum advantage.

Acknowledgments

The Author would like to express his thanks to the directors of Fairbairn Lawson Combe Barbour, Limited, for permission to publish this paper, to his colleagues in the Wellington Foundry, and particularly to Mr. B. J. Rule, chief inspector of Newall Engineering Company, Limited, Peterborough, for his assistance in the preparation of the paper. Photographs are reproduced by the kind permission of Newall Engineering Company, Limited, and BSA Tools, Limited.

MR. D. R. O. THOMAS, chief education officer of the United Steel Companies, Limited, Sheffield, recently presented the evidence of the Federation of British Industries to the Committee on Higher Education. Mr. Thomas was chairman of the Federation's working party which prepared the evidence. The Committee on Higher Education under the chairmanship of Lord Robbins, is reviewing the pattern of full-time higher education in the light of national needs and resources in order to advise the Government on long-term development.

Alloy for Waterworks Valves*

The Department of Water and Power of the City of Los Angeles, in a demand for protection against dezincification and de-aluminization, ruled out most of the qualified alloys used for bronze valve-stems. Alloys normally used for these stems—manganese-bronze, aluminium-bronze or silicon brass—could not meet Los Angeles requirements because under certain conditions, "soft" water dissolves both zinc and aluminium out of the alloys, reducing them to a weak, spongy, copper matrix, resulting in a broken valve stem at a time when it is needed, which could cause disaster. With no adequate sand-casting alloy available to meet the demand of the specification (27 tons per sq. in. tensile strength, 13 tons per sq. in. yield strength, 12 per cent., elongation, and no more than 7 per cent. zinc and 2 per cent. aluminium), the US foundry industry faced a loss of an important market.

The alloy developed, which contains a maximum of 7 per cent. zinc, 2 per cent. aluminium, 5.5 per cent. nickel, 5.5 per cent. iron, 2 per cent. silicon and 0.25 per cent. lead, is stated to meet the tensile and yield strength requirements, as well as the elongation test. A further advantage put forward is the elimination of any need for heat-treatment, typical properties of the alloy being 29 tons per sq. in. tensile, 15 tons per sq. in. yield, and 25 per cent. ductility.

Manufacturing Details

The Kennedy Valve Manufacturing Company of Elmira, New York, is already making valve stems of this alloy, and Mr. Carl Morken, vice-president and works manager of the company—one of the men instrumental in helping to develop it—says it has good machinability and offers a low scrap-rate. At Kennedy's, bronze alloys are melted by indirect-arc rocking electric furnaces, a charge of 400 lb. consisting of 50 per cent. ingot and 50 per cent. returns and melting down in 25 min. When the melt reaches 1,200 deg. C., 200 lb. is tapped into a pouring ladle which is moved manually by monorail from the melting section to the pouring area. Immediately after tapping, the melt is given a degassing treatment in the ladle to remove all traces of H_2 content, by bubbling through low-pressure nitrogen gas for 30 to 40 sec. The nitrogen is introduced by means of a ¼-in. wrought-iron pipe immersed 8 to 10 in. into the melt, and after degassing, the metal is poured usually around 1,175 deg. C.

For making valve stems, four stems are cast in a single mould. The stems, which are 17-in. long, require flasks measuring 24 by 11 by 3½ in., and the sand mix employed consists of 12 per cent. Western bentonite, 12 per cent. Southern bentonite, ½ per cent. hard wood-flour coated with graphite and 2.5 per cent. H_2O, and the properties of the sand are quoted as 183 AFS grain-fineness-number silica sand, 26 to 30 permeability, 11 to 13 lb. per sq. in. green-strength and 0.020 to 0.022 green deformation. Briefly the moulding operations for the valve stems are as follow: Two stems are fed from a single feeder with a gate leading the metal to each of the two feeders. The feeders measure 2½-in. dia. by 3½-in. high and the yield runs about 50 per cent.

It is stated that the development of this alloy may provide for more applications, *e.g.* the cavitation and de-zincification problems long associated with ship propellers indicate a possible further market. As dezincification is particularly severe in salt water, valves and fittings on ships also represent a natural application. The alloy's good electrical conductivity offers electrical-contact applications and these are now being explored.

* Abstract of an article appearing in *Modern Castings*, 40, No. 4.

Wet-type Dust-, Grit- and Spark-arrester

Installation and Operation with a Cold-blast Cupola.

Nearly every ironfounder in this country in recent years has had to concern himself with the problem of dust, fume and grit emission from the cupola furnace, in order to comply with the conditions of the Clean Air Act. Much speculation has followed as to the relative efficiencies of various types of plant, but unfortunately factual data have been meagre. The following article relates to one type of plant at one particular foundry, but it does give details of how the job was tackled and records full particulars of how well the arrester is doing the job for which it was designed. As such it will be of help to many faced with similar problems and the firm is to be congratulated on making the information available.

The spark-arrester* installation to which this article refers, was carried out at the works of Monmer Foundry Limited, Willenhall, Staffs, for the purpose of complying with the Clean Air Act, 1956. It was realized by the foundry management that some improvement over the existing dry-type collector would, sooner or later, be required and they, therefore, took steps to fit a wet-type arrester, which would be of higher efficiency. The company concerned are manufacturers of thin-section grey-iron castings, used largely in the electrical industry for switchboxes and similar equipment. In view of this, the metal run from the cupola, which is rated at six tons per hour, is at a temperature of about 1,550 deg. C. The charge consists of good-quality scrap, No. 3 Stanton pig and the coke charge is of Welsh Cwm coke. The dry arrester previously fitted, which was of the expansion-chamber type, had been operating for some years and did collect a quantity of fairly-large particle dust, but, nevertheless, quite a lot of small-particle dust and grit was discharged to atmosphere. In addition, it was found that the impingement plate within the dry collector did, from time to time, require replacement, due to burning away and during this particular period, prior to it being replaced, virtually all the dust escaped.

The wet-collector installation was carried out in January, 1961, and was completed without interrupting the work of the foundry in any way. The dry arrester was removed and the new arrester head, together with the necessary cupola-stack extensions, was fitted and by close liaison with the foundry management this was carried out with the minimum of delay (Fig. 1). One item of difficulty concerned the lining of the extension with refractory brickwork, but this was overcome by having the extension and arrester brickwork carried out before the plant was lifted into position.

Operation

Right from the commencement of operation of the wet collector, systematic records of its performance have been kept by the foundry management themselves and the results, made freely available, form the basis of this report. The settling tank employed was designed by the arrester manufacturing company who were aware of the difficulty

FIG. 1.—*General view of the wet-type arrester installed at the works of Monmer Foundry, Limited. At the top can be seen the arrester head, and at ground level the inverted cone of the settling tank. The two heavy pipes leading down the left-hand wall of the foundry building drain the suspended filtered-out material into the settling tank. Below this tank is the sludge box which can be isolated for ease of removal of the sludge.*

* The arrester and ancillary equipment which is the subject of this article was manufactured and installed by Filter Heat, Limited, Leigh, Lancs.

of cleaning out the grit and dust from a tank, either by digging out or by the use of scraper conveyors. In the system used, the dust and grit collected passes downwards through the tank into a separate container, which can be isolated. The excess water is then syphoned off and the sludge removed, allowed to dry off and then weighed. During the syphoning-off process there is some loss of solid material, so that the figures indicated in Table 1 are conservative, since no attempt has been made to make any check of the solids lost. The cupola is operated with two melts per day. The first of these takes place at about 11.30 a.m. and continues for approximately 1½ hours and the second commences at about 3.30 to 4 p.m. and continues for about 2 hours. During this period, metal is almost continuously removed from the cupola. As will be seen from the information given above, the metal is run at an unusually high temperature because of the nature of the castings. It is the practice to remove the sludge collected after every three melts, as this has been found to be the best time. If the sludge box is allowed to fill for four or more melts, the amount of dust and grit collected exceeds the capacity of the container and prevents the plant operating efficiently. Few of the heavier particles of grit are in circulation in the water, since the tank is designed to separate these out as the water drains back from the arrester head. It is obvious that some of the smaller particles collected at the arrester head circulate with the water during the pumping period. It is found, however, that these settle out during the shut-down so that the majority of these particles are eventually passed into the sludge box. No attempt has been made to add a coagulant to the water to promote rapid settlement.

Control of Acidity

The question of neutralization of the water in circulation has been very carefully studied and a suitable alkali is added manually during the period of the plant operation. The quantity of alkali to be added is calculated by first carrying out a titration test against a sample of the water taken. Knowing the quantity of water contained in the system and the characteristic of the alkali, it is possible to calculate and add the required quantity. As will be seen from Table 1 (column six), this works out at an average of about 2¾-lb. per ton of metal melted. There is, however, a certain variation in this quantity which is dependent largely on the amount of sulphur contained in the coke and to a lesser extent on the material melted. The particular alkali available to the foundry being discussed is relatively cheap. Although manual control of the acidity of the water is practised at the installation studied, systems for automatic control of acidity are, of course, available. The cost for a completely-automatic alkali dosage system is about £500. In the automatic control system envisaged, a solution of the alkali is made in a suitable container and is fed to the circulating water as and when required at a rate controlled by means of suitable instruments.

"Topping-up"

The cold water make-up added to the tank is regulated by means of a ball valve and replaces

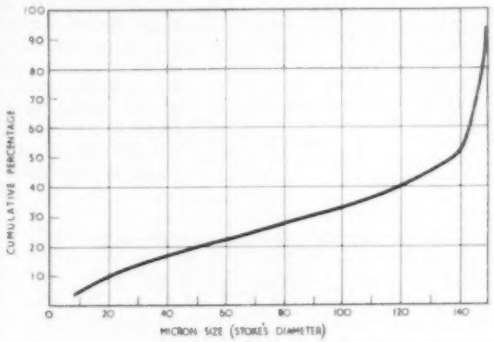


FIG. 2.—*Graphical representation of the particle size of the dust collected (test on material passing 100 BS mesh).*

that evaporated during the operation. It will be appreciated that under such conditions as described above, the temperature of the exhaust gases from the cupola is unusually high and is generally of the order of 600 deg. C. The water in circulation heats up to a maximum of 180 deg. F., at which temperature there is considerable loss as water-vapour from the top of the tank and some evaporation takes place in the arrester head itself. Checks on this loss indicate that about 75 gall. of water are evaporated for each ton of metal melted. In connection with this aspect of the arrester, it will be seen that there is a considerable amount of heat available in the reservoir tank, which could be utilized for heating purposes should it be so required.

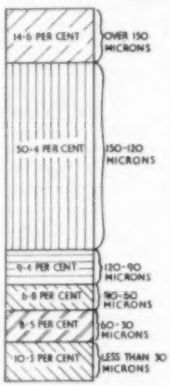


FIG. 3.—*Particle-size distribution in dust sample taken from the settling tank at Monmer foundry's wet-type dust-arrester plant.*

Particle-size Analysis

Examinations of the collected dust and grit have been carefully made (Fig. 2). The first test carried out was to determine the actual particle size dis-

tribution and a block graph (Fig. 3), indicating conditions found, is shown herewith. It will be seen that there is about 10 per cent. of less than 30 microns. It is, therefore, possible to calculate the quantity of fall-out of differing particle sizes at varying distances from the cupola, dependent, of course, upon the wind conditions applying at any particular time. The quantity of dust and grit collected has been remarkably consistent throughout the operating period of the plant and is just under 30 lb. per ton of metal melted. This figure, being an average one, indicates that the plant is running at a very-high efficiency and shows a satisfactory performance. A sieve analysis made of the dust collected is as follow—the first figure being the BS sieve number, followed by the corresponding percentage by weight:—+44, 0.8; 44 to 100, 13.8; 100 to 150, 28.0; 150 to 200, 6.8; −200, 50.6.

TABLE 1.—*Results obtained from a Wet-type Arrester fitted to a Cupola at Monmer Foundry, Limited, Willenhall, Staffs.*

Week ending.	Metal melted tons.	cwt.	qr.	lb.	Dust collected cwt.	qr.	lb.	Dust/metal lb./ton ratio.	Consumption of neutralizer.	Neutralizer/ metal lb./ton.	Water make-up gall.	Water/metal gall./ton.
17.1.61	9	15	0	0	2	3	7	32.3	60	6.1	700	71.7
24.1.61	27	2	0	0	6	1	0	25.83	62	2.28	2,010	74.1
31.1.61	27	2	3	14	7	0	0	28.9	60	2.21	1,835	67.6
7.2.61	26	19	2	0	6	1	7	26.2	90	3.3	2,220	82.2
14.2.61	26	10	3	9	7	2	0	31.6	90	3.3	2,210	83.2
21.2.61	30	4	2	0	6	0	0	22.23	50	1.6	2,293	75.3
28.2.61	30	0	0	18	6	3	0	25.19	50	1.6	2,215	73.8
7.3.61	32	0	1	0	9	2	0	33.2	55	1.7	2,350	73.4
14.3.61	29	9	1	11	8	0	0	30.4	85	2.88	2,040	69.2
21.3.61	29	9	1	11	8	1	0	31.3	90	3.05	2,300	78.0
28.3.61	29	18	0	0	8	0	0	29.9	60	2.0	1,990	66.5
4.4.61	16	11	2	0	5	1	0	35.4	42	2.5	1,192	71.9
11.4.61	27	9	1	0	7	2	0	30.6	75	2.7	2,088	76.0
18.4.61	31	0	1	0	8	1	0	29.4	100	3.2	2,110	67.9
Weekly averages	26	16	3	2	6	3	23	29.5	69.2	2.6	1,817	68.1

Conclusions

The results obtained from the installation, which have been collected by the management of the foundry concerned and not by the manufacturers, indicate that the wet-type of grit arrester sets a satisfactory standard of performance and can, therefore, make a very valuable contribution towards the implementation of the Clean Air Act, 1956. The cost of the installation, while undoubtedly considerably higher than that of dry arresters, is by no means excessive and does not reach the expenditure required to fit very-high-efficiency units such as electro-static precipitators. The high temperatures concerned do not materially affect its operation nor is there any need to put in special cooling arrangements, such as would be necessary for the use of high-efficiency fabric collectors.

Publications Received

Annual Report 1960-61 of the National Metallurgical Laboratory, Jamshedpur, India.

No fewer than 74 investigations are listed in this annual report, and seven are connected with foundry practice. Compared with similar European reports, this would seem to be a more costly production; it has stiff covers and runs to 150 pages. This expense no doubt is warranted, as when the contemplated extensions to the laboratory are completed "it will be one of the largest of its kind anywhere in the world." It employs no fewer than 800 people already.

The most important activities of this laboratory are the instalaltion and operation of pilot plants for a number of metallurgical processes of basic interest to the development and usage of Indian raw materials. An interesting feature is an account of the establishment of four regional research stations for aiding foundries in widely separated regions. The Report covers all the usual services—plant visits, library and information services.

Guide to the Study of the European Communities. Published by the Information Service of the European Communities, 23, Chesham Street, London, S.W.1.

This *Guide*—No. 3 in the series "Community Topics"—contains an extensive reading list of official publications, books and articles dealing with general aspects of post-war European history, the "Communities" themselves, and the development of the United Kingdom's policy towards them. In addition, it gives a short list of films available on free loan on the work of the Communities, and notes on further sources of information, other European organizations, and voluntary bodies concerned with European matters in the United Kingdom. Copies of the publication, which is free of charge, may be obtained on application to the address quoted.

Also available is a short, illustrated folder—"This is the European Community"—which describes briefly the aims and institutions of the Community. It has been designed with the needs of the tourist in mind, and a special feature is a series of tables giving useful practical information for those visiting the six member-countries. This includes: currency equivalents, weights and measures conversion tables, and continental equivalents of shirt and shoe sizes and tyre pressures.

Training, No. 40. Issued by the British Iron and Steel Federation, Tothill Street, London, S.W.1.

The iron and steel industry is pre-eminent in the attention it devotes to training of all classes of its personnel and between now and March, 1962, no fewer than 22 courses are announced by the British Iron & Steel Federation to take place in five centres. The magazine also covers the international aspects of training. From the numerous photographs of young operators, it is obvious that a good type of lad is being attracted to the industry.

Correspondence

To the Editor of the FOUNDRY TRADE JOURNAL

WHAT BUYERS WANT

SIR—Your Leader in the issue of the JOURNAL for November 16 made interesting reading. I have been privileged on one or two occasions to attend the same sort of meetings in the course of business, with similar results to those you describe. I agree absolutely with your own observations and the picture your Leader gives is a true one.

As an adviser on foundry matters I have campaigned for years against payment by weight as being unfair to customer and supplier alike. I well remember in the first flush of enthusiasm changing some old designs so that they could be made on mechanized plant. More-expensive pattern equipment allowed two or three castings to be made in the time of one, yet, because individual weight increased, the casting price increased *pro rata*. The engineer's comments can be imagined! I call to mind also a large aluminimum cover ¼ in. thick in its general section. For years this had been made, with difficulty, from a loose pattern; all sorts of tricks were resorted to to obtain castings but they remained generally poor in appearance and there was a large scrap ratio in production due to misruns, etc. Naturally, the job was very unpopular in the foundry. I persuaded the engineer concerned that the minimum casting thickness for this type of casting ought to be ¼ in. He agreed finally to alter the thickness to $\frac{5}{32}$ in. Following this, good castings were obtained at a greatly reduced scrap rate but a tremendous outcry arose from the buying department, when the bill came in for double the amount! All agreed that extra metal must be paid for but not at a price which included labour charges as well, since the labour cost had been reduced and the scrap incidence almost wiped out. The matter was adjusted to everyone's satisfaction finally, but I had to do a lot of quiet "spadework" afterwards to persuade the engineer concerned that not all concessions to the foundry would adversely affect his pocket. There were many such incidents before I learned to provide for them in my negotiations. The assessment of the value of a casting by weight gives a false sense of its true value, and is particularly misleading to buyers, who may find it an easy way out of an awkward situation.

I was intrigued by the importance placed on the value of having technical representatives available at purchaser's convenience, since I have filled such a position for a number of years though on the purchasing side rather than the supplier's. With more personnel receiving technical training it may well be that such an idea will see fulfilment. I wonder if its propagandists realize what an exacting job it can be! It is a position which must be filled adequately or the consequences could be more harmful than if it were left vacant. A major failure through faulty advice could destroy completely the confidence which prompted the engineer or buyer to seek that advice. Should the qualification for the job be technical achievement or practical experience?

Who'd be a Representative?

My experience in such a capacity may be of interest. Whoever essays this work has a difficult job to do for he is out in the open and on his own. He must be able to form a quick assessment of casting requirements, very often from a drawing only half completed, and pick out the salient points.

Thereafter, while discussion proceeds, he must be on the lookout for the finer points he might have missed in the first instance. He must bear in mind pattern-making and moulding difficulties in order to avoid them; and running feeding and fettling problems must receive attention also. He must consider mechanization as against loose-pattern moulding and the cost of each against the quantity required. He should have knowledge of the vagaries of all the different metals and of many of the processes both within his own field and outside it. He must be quick in assessment and yet circumspect in judgment. No engineer will take kindly to drawing alteration a second time after going to the trouble of consulting the foundry on the first occasion. In addition he will require a personality suited to the work. None of this is impossible of attainment by a fully experienced man, but he will have to study and work hard in directions where his experience had not previously led him.

I am in late middle life and all the working part of that life has been spent in the foundry industry. During the last ten years I have acted in an advisory roll to some 300 engineers, draughtsmen and buyers with the main object of influencing them in favour of the foundry process. I have worked as the representative of the *customer*, with numerous foundries serving the company in all metals and by most of the processes. It has been a stimulating and most rewarding experience and well worth the strain of the probationary period.

Contrary to the general opinion in foundry circles, engineers—with rare exceptions—are very co-operative, though certainly hard-headed. They require facts backed up by lucid and logical argument, and have a gift for asking the awkward question. In order to answer them with profit to all parties it is necessary to have a clear understanding of the materials and processes involved. This clarity must be preserved through all the many side issues which arise from time to time, and in spite of the complexity of foundry practice: no mean achievement believe me! The old mysterious attitude persisted in by so many able foundrymen must be dispersed; and "fairy stories" avoided however great the temptation—nothing annoys the modern engineer more and he can sense such things a mile away. In this manner only can one build up integrity and reputation for putting forward hard down-to-earth facts which carry conviction; and which will at the same time provide latitude for the occasional gamble in judgment that one must take from time to time in reaching an on-the-spot decision.

Still in Doubt

I would like to give a final example of how the necessary clarity of mind must be preserved, and to do so I must refer (at the risk of stepping out of line) to the recent correspondence of "Drummer" and his "Brake-drum Problem" (initial letter, JOURNAL, September 21). One of my earliest assignments was an investigation into the large scrap ratio in our machine-shops due to porosity in castings required to be pressure-tight. The scrap ran as high as 75 per cent. and was persistent, recurring in replacement castings also. After a long investigation into the properties of various cast irons and their manufacture, a programme was devised in conjunction with chosen suppliers which gave us castings able to sustain the requisite pressure test. Since that time the company has purchased thousands of such castings and failure under pressure is virtually non-existent. I have followed the Brake-drum Problem, therefore, with great interest with particular reference to the reported effect of expansion of the eutectic and/or inoculants, of which I had read somewhere before. Unfortunately, the correspondence has apparently closed without a definite reply from "Drummer" as to which of the methods suggested have proved efficacious in solving his problem.

In my job, I still have a watching brief on pressure-tight castings; I find therefore that I have to ask myself the following questions. Must I, in searching for manufacturers of pressure-tight castings avoid (*a*) all users of inoculants; (*b*) production by mechanized methods; (*c*) certain high-duty irons? My instinct tells me that the situation is not such a straightforward one as this and that it would be unfair to act in this way. I feel still, that there is a strong connection between the hot areas obtaining in the mould and porosity, whether incipient porosity is due to expansion of the eutectic, inoculation, or plain solidification shrinkage. Nevertheless, in fairness to my company I must "look with a jaundiced eye" on all users of inoculants or mechanized plant when seeking pressure-tight castings, until such time as my view is clear on this particular phenomenon. Hence my disappointment at not yet hearing conclusions to this correspondence.

Some time ago I asked if the JOURNAL could publish more articles of a practical nature. The correspondence on the "Break-drum Problem" and your leader "What Buyers Want" are excellent miniatures of the type of writing I had in mind.—Yours, etc.,

W. H. BOND.

Sutton Coldfield,
Warwickshire.
November 22, 1961.

Diploma in Technology Awards

The National Council for Technological Awards has conferred Diplomas in Technology on the following candidates:—

Metallurgy

First-class Honours:—Mr. M. E. Giles, from Carshalton, Surrey; Mr. J. D. Lane (United Kingdom Energy Authority, Warrington); Mr. C. G. W. Roffey (Crewe, Cheshire), and Mr. P. M. Mole (GEC research laboratories).

Second-class Honours:—Five candidates from Richard Thomas & Baldwins, Limited, qualified for second-class honours. They are Mr. R. R. Briggs, Mr. H. A. Brown, Mr. G. A. Gomm, Mr. J. W. Griffin and Mr. N. B. Shaw. Others in this category are:—Mr. G. W. Dawson (International Nickel Company (Mond), Limited); Mr. M. M. Haberlin (United Kingdom Atomic Energy Authority); Mr. A. C. Parmee (British Non-Ferrous Metals Research Association); Mr. A. B. Pollard (Stewarts and Lloyds, Limited); Mr. R. D. Shaw (Zirconal, Limited), and Mr. R. H. Tharby (G. A. Harvey & Company, Limited).

Pass level was obtained by Mr. S. O. Prest and Mr. R. F. Wyers, both from Richard Thomas & Baldwins, Limited.

AN ARTICLE in the news-sheet of Marshall, Sons & Company, Limited, engineers, Gainsborough, speaks of the wastage of electric lamps. It states that throughout the firm's offices and works last year no fewer than 2,972 lamps were replaced—an average of 12 lamps each working day. It states, "Bearing in mind that some of our large lamps cost £6 each, and that the time taken to change those in high bays is quite considerable, it is clear that such a simple task as changing lamps is not without expense. However, no-one begrudges money expended on light, which is so necessary for us to do our work properly; but when you walk round a firm in broad daylight and see lights on because no-one has thought to switch them off—well, it makes you think!"

International Foundry Congress

Preliminary Detroit Plans May 7 to 11, 1962

A three-language brochure has now been issued by the American Foundrymen's Society (from Golf and Wolf Roads, Des Plaines, Illinois, USA), giving preliminary particulars of the 1962 International Foundry Congress which is to be held in Cobo Hall, Detroit, from May 7 to 11. Coupled with the meetings will be an exhibition of foundry equipment and materials and the Congress will be preceded by two "productivity" tours, each of two weeks' duration, of American foundries. The latter will replace the usual post-Congress tours which have been a feature of many previous international gatherings. The AFS is to present over 100 papers dealing with various phases of metals practice and metallurgy, and augmenting this programme will be some 30 official exchange papers and international papers.* Arrangements have also been made for visits to works in the vicinity of Detroit which range from specialized jobbing shops to highly-mechanized foundries.

Registration offices will be open at Cobo Hall all day Sunday, May 6. Throughout Congress week, information centres in the exhibition halls will be manned by multi-lingual personnel to assist visitors from far-distant countries. UK applications to participate should be channelled through Mr. G. Lambert, secretary of the Institute of British Foundrymen, 14, Pall Mall, London, S.W.1, who is arranging group bookings for transport and accommodation. Applications for accommodation for foundrymen from overseas—where *not* channelled through local foundry associations—should be directed to the AFS Housing Bureau, 626, Book Building, Detroit 26, Michigan, USA. Room assignments and confirmations will be made starting January 1, 1962.

In connection with the Exhibition, the AFS announces a new "package display" plan. By this scheme exhibitors will be able to rent special "Porta-Stack" units and furnishings, and the arrangements include erection and dismantling services, electrical connection and provision of furniture for the stands.

Training Schemes needed in Midlands

At a Press conference following the meeting in Birmingham on November 20 of the Midland Regional Committee of the Industrial Training Council, Mr. F. Garner, chairman of the committee, said that firms were still not providing enough training schemes for new entrants and that so far this year 37 per cent. of boys and 40 per cent. of girls leaving school had entered jobs which offered no form of systematic training. The number of youths entering apprenticeships had shown an increase in the past year from 30 per cent. to 36.5 per cent., but the Midland ratio still fell short of the national average. He added that the annual intake of apprentices into the engineering industries still amounted to only 2 per cent. of the total number of skilled workers already employed. The industry, he said, was not recruiting at a rate to balance the natural wastages in skilled labour, let alone provide for future expansions.

The number of school-leavers in the Midlands next year is likely to be 24 per cent. higher than last year, and the committee hoped that any expansions in the intake of apprentices would be accompanied by development of training schemes for semi-skilled employees.

* Those interested in presenting technical papers at the Congress should write immediately to their member associations of the International Committee, or direct to the technical director, American Foundrymen's Society. Rules and regulations for papers are now available.

Engineering Products and Processes Exhibition

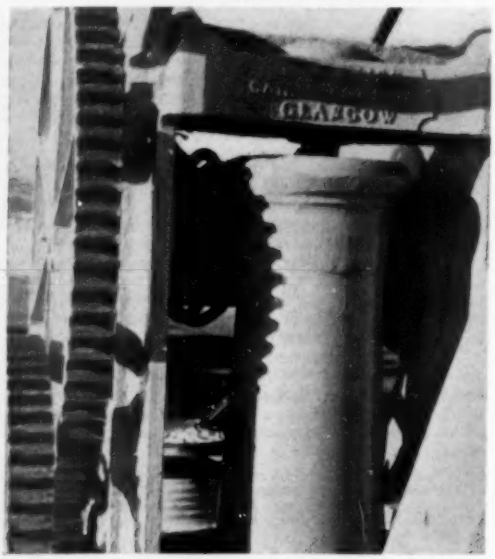
The first one-day display of engineering products and processes was held at Belle Vue, Manchester, on November 21, and was organized by the North-West Region of the Engineering Industries Association. Exhibits were on view from 55 firms, occupied 69 stands and covered a wide field of products; they ranged from photographs and small samples to complete machines and fabrications. Firms participating in the exhibition included Heatley & Son, Limited (mechanical-handling equipment, ferrous and non-ferrous founders); Bratby & Hinchliffe, Limited (non-ferrous castings and machine components); Fletcher Miller, Limited (metal-cutting fluids, machine-tool lubrication); Swift Levick & Sons, Limited (stainless-steel castings, tool steels and permanent magnets); C. H. Johnson (Machinery), Limited (conveyors and mechanical-handling equipment), and the British Oxygen Company, Limited (standard tooling aids, die sets, etc.).

The Engineering Industries Association was founded in 1940 and has over 3,000 national members, with some 500 of these situated in the north-west region. The Association is able to advise its member-firms on many problems, such as finance, taxation, export procedure, provision of raw materials, placing and finding of sub-contract work, etc. It organizes an annual exhibition in London where members' products are on view, in addition to arranging one-day displays in different parts of the country to promote local interest.

Identity, Please!

Photographed this year at Port St. Mary, Isle of Man, this dockside crane is in perfect working order and still in use. It is clear that moulders of the older generation could certainly produce good castings. The maker's name—H. & R. Baird, Canal Foundry, Glasgow—is particularly distinct. Yet the query remains: How old is the crane and does the Canal Foundry still exist; readers' comments will be welcomed.

(Photograph by courtesy of L. A. Witham)



Thos. C. Fawcett celebrate Centenary

Thos. C. Fawcett, Limited, engineers and foundrymen, Whitehouse Engineering Works, Hunslet Road, Leeds 10, celebrated their centenary this year with a dinner/dance at the Griffin Hotel, Leeds, when nearly 300 people were present. The firm specializes in heavy clayworking machinery, lead-fabricating equipment, and coal-briquetting plant. Guests were welcomed by Mr. T. C. Fawcett, chairman of the company, who presided.

Mr. F. W. Clark, immediate past-president of the Institute of Clay Technology, said that the firm had always been noted for the quality of the machines they produced, and for the spare parts and castings which were so vital for maintenance in an industry which, to say the least, was very exacting. It was announced by Mr. Eric Shipley, managing director, that next year the company would be embarking on a big expansion scheme which would double productive floor space; this, he said would be completed in 12 months. Long-service awards were then presented by Mr. Fawcett to six employees.

The firm was founded by Mr. Thomas Constantine Fawcett, who patented a brick-making machine which won five gold medals at exhibitions in various parts of the world.

Teachers in Technical Colleges

The target figure of 18,600 full-time technical college teachers by 1961, set by a special committee in 1957, has been reached and passed says a report* of the National Advisory Council on the "Training and Supply of Teachers." The report, in a forward look, now estimates that the number of technical college teachers will need to be doubled by the end of this decade. Steps to meet this demand are being examined. A section of the report discusses the supply of teachers in the "shortage" categories, such as graduates in mathematics and science and various technologies, or those holding advanced qualifications in technological subjects. The report concludes: "The plans for university and technical college expansion give promise of a large rise in the supply of trained manpower during the decade. We hope that our estimates will be taken into account in determining both recruitment policy and the provision of training places in the future."

* "Teachers for Further Education"; published by Her Majesty's Stationery Office, York House, Kingsway, London, W.C.2; price 1s. 3d.

US Company to spin in Northern Ireland

An American corporation, T. J. Stevenson and Company, of Broad Street, New York, whose interests include shipping and textiles, has decided to establish in Northern Ireland a subsidiary company, Ulster Textile Mill, Limited, it was announced by the Ministry of Commerce in Belfast last month. The company is taking over the Government-built factory at Newry, Co. Down, formerly occupied by Horrockses Crewdson & Company, Limited.

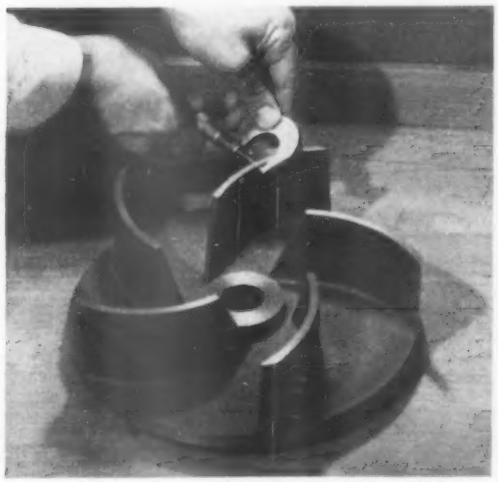
The American company was expected to move to the Newry mill this month and carry out extensive modernization and re-equipment. It is planned to instal new spinning machinery of advanced design and to operate a three-shift system. The work of re-equipment will last several months, and production is expected to start next spring, with the working force rising to 325, of whom more than 200 will be men.

Die-casting of Titanium

Titanium Metals Corporation of America recently announced the development of a method for casting small parts in production quantities. The result of a two-year research programme, the casting procedure—called Impel casting—is said to be a major departure from all casting work done in this metal to date, in that gravity-dies are used. This approach promises to reduce mould costs that must be incorporated into the price of such parts as pump housings, impellers, valve bodies, fittings and pumps sleeves. Up to the present, titanium has been cast in graphite moulds, with the number of parts limited to about 10 or 12 per die on some occasions, and often one part per die. Die costs thus have made the price of titanium castings prohibitive for most applications where castings are normally employed. Accordingly, cast titanium parts have had a negligible effect on the titanium market. By contrast, castings form a substantial proportion of the output of the rest of the non-ferrous metals industry, providing about 19 per cent. of aluminium output, 23 per cent. of magnesium and 88 per cent. of zinc-base shapes. In work completed so far, TMCA has produced 40 castings per die,* but believes at least 100 are possible. The first commercial order accepted by TMCA—a 12-lb impeller (Fig. 1)—showed that die costs could be absorbed and delivery completed of just nine impellers at prices lower than charged for titanium welded assemblies now in use. TMCA's present equipment limits the production of castings to 12 lb. with maximum boundaries of 5 by 10 by 24 in.

* According to information received, the dies are of mild steel.—EDITOR.

FIG. 1.—*This 9-in. dia. impeller is the first titanium casting produced by a new gravity-die-casting procedure developed in America, and providing the die life necessary for continuous production.*



Cast Properties

Because TMCA is gearing its current activity toward development of chemical process applications, the company is casting unalloyed grades of metal where corrosion resistance is more important than extremely-high strengths. This concession is not as critical as it would appear since great strengths can be developed even in unalloyed grades. For example, yield strengths have been obtained in cast products ranging from 11 to 45 tons per sq. in. depending on which of the unalloyed grades was used. In general, properties obtained have been similar to those achieved in bar products. Porosity appears to pose few probblems. It is in evidence only in section sizes of one-half inch and greater, but can be "moved" to areas where it is unharmful through proper die-design. To guarantee that this phenomenon is within acceptable boundaries, stressed parts or rotating parts are X-ray inspected. TMCA has yet to encounter surface porosity. The corrosion immunity of the metal thus will prevent an attack in any area that might be subject to porosity.

The Impel casting process relies on the excellent fluidity of titanium in the production of high strength, accurate, intricate and stable parts. It requires a titanium electrode, double melted, with molten titanium "impelled" into the die cavity. The shrinkage rate of titanium—0.005 in. per in.—makes timing a critical factor in feeding the metal into the die cavity and pulling the cores before titanium freezes to either or both. Timing is now automatic, but was done with a stop watch for the first year of research. Core pulling is essential to the casting of hollow parts. With titanium, 12-in. cores—about the size pulled from a cast automobile engine block—have been pulled successfully.

The use of gravity dies is the major advance in titanium casting completed to date. All development activity has been aimed at the use of graphite dies—either machined or rammed—employed in casting procedures similar to sand casting. In fact, titanium casting completed with this technique has reached the point where castings up to 148 lb. with dimensions of 72 by 36 by 24 in. have been produced. None of the graphite die material, however, provides the die life required for continuous production. It is in this area that Titanium Metals Corporation of America is confining its marketing efforts. On extremely-large production runs, where several dies are likely to wear out, the dies themselves can be cast, further reducing the cost of the part involved.

THE FOURTEENTH LIEGE INTERNATIONAL FAIR is to be held from May 26 to June 11, 1962. Details are available from Mr. R. C. Liebman, 178, Fleet Street, London, E.C.4.

Dermatitis and Synthetic Resins

The growing use of synthetic resins in the foundry industry—their major use is in the making of patterns and in core and mould making—has increased the hazard of dermatitis. To draw attention to this hazard, and to give advice on the precautions to be taken when using synthetic resins, the Ministry of Labour has issued Form 331—a memorandum on the "Prevention of Industrial Dermatitis from Synthetic Resins"—from which the following information has been extracted.

In dealing with the irritant effects of synthetic resins, it is pointed out in the memorandum that glued plywood and veneers may be machined or sanded, sometimes before the glue is completely set. The dust from these operations is liable to set up irritation particularly if the raw edges of the boards inflict damage to skin. Glass fibre used as a filling agent may cause injury to the skin, thus enhancing the liability to irritation by resins.

Prevention of Dermatitis

The precautions suggested below should always be adopted from the outset whenever synthetic resins are handled. Particular care is necessary when using liquid amine hardeners with epoxy resins as they may induce sensitisation.

(i) *Substitution by Safer Materials*

Thought should in the first instance be given to the possibility of using non-irritant resins and components. Where that is not possible, the least-irritant hardener available should be used.

(ii) *Limitation of Skin Contact*

Every effort should be made to prevent the raw or partially-cured resin, as well as the hardeners or catalysts, from coming into contact with the worker's skin. Benches and equipment should be kept clean and the use of expendable covering to benches encouraged. The handling of materials may be reduced by the mechanization of processes. The mixing of resin and hardener should be restricted to skilled personnel; and the mixed components should be delivered to the users in covered expendable containers. Enclosure in a mechanically ventilated cabinet will prevent contact with fume given off when adding hardeners and will control dust; where enclosure is not practicable, local exhaust ventilation should be applied to the point of origin of the fume or dust.

(iii) *Protective Clothing*

This is a means of preventing contact of harmful materials with the skin and is a protection to the worker's own clothing. Gloves, gauntlets, long-sleeved overalls, or other means of protecting the hands and forearms should be provided and used. Gloves should be clean inside and in sound condition. It is important that the protective clothing should be well maintained and stored when not in use in a place apart from ordinary clothing.

(iv) *Barrier Substances*

The application to the skin of a suitable barrier preparation, water miscible or water repellant as the circumstances demand, should be considered as an additional means of limiting contact between the skin and the materials which give rise to dermatitis; but advice should always be taken on the choice of a preparation that is suited to the particular work and the workers should be carefully instructed in its use. The chosen preparation should be carefully applied to the exposed skin, after first washing and drying, before each spell of work.

(v) *Inspection*

Inspection of the skin of those exposed to a dermatitis risk should be carried out regularly and frequently, preferably by a trained observer such as the works doctor or nurse; this procedure, which is also a check on working conditions and methods of working, is of great use, ensuring that any evidence of skin irritation is recognised in its earliest stage. Where there is no works doctor or nurse, a trained first-aid attendant can become a competent observer within the limitations of his functions but it is important that medical advice should be sought in the early stages of any skin irritation.

All observers need the co-operation of management if preventive measures against skin disease are to be made and kept effective.

(vi) *First-aid Treatment of Injuries*

In the case of injury the considerable protection afforded by the healthy intact skin is endangered. Irritant materials are no longer on the surface of the skin but within it. First-aid treatment should therefore be obtained for every injury however seemingly trivial. In the case of eye injuries advice is given in the first-aid leaflet (Form 1008). For any condition outside the scope of first-aid treatment early medical advice should always be sought.

(vii) *Cleanliness*

This is perhaps the most important of all the measures for the prevention of dermatitis. Adequate facilities for washing are essential; they should be provided at or very near the place of work so that accidental contamination can at once be removed from the skin. Washing accommodation should be kept clean and be provided with a plentiful supply of clean running hot and cold or warm water, soap or other cleansing agent and towels. The importance of removing all irritant materials from the skin without delay can hardly be over-emphasized for the longer the irritant remains in contact with the skin the greater is the risk of dermatitis. *Synthetic resins must not be allowed to harden on the skin.* The solubility of the uncured resin and rate of setting are factors which determine the ease with which a resin can be removed from the skin. A damp swab or a resin-removing cream, specially compounded to remove epoxy resin without damage to the skin, should be kept on the working bench for immediate use.

The wearing of personal clothing which has been soiled at work will increase the risk of dermatitis; workers should therefore be provided with, and encouraged to use, changing facilities and to leave work-soiled clothing at the factory.

Education and Co-operation

It is essential that the simple facts about dermatitis and its prevention should be made known to workers in order to secure their co-operation in any planned programme of precautions. A cautionary notice (Form 366) has been prepared for the advice of workers using synthetic resins; it should be displayed so that it can be read by those concerned.

A COURSE OF TEN LECTURES on "Modern Developments in Cast Iron" is to be held at the College of Advanced Technology, Gosta Green, Birmingham 4, on successive Wednesdays at 6.30 p.m., commencing January 24, 1962. The lectures will cover developments in melting practice, foundry sands and various types of plain and alloy cast irons. Details and application forms can be obtained from the course tutor, Mr. J. C. Billington, at the address quoted.

Stanton Prizegiving

The Club House at Stanton was packed to capacity for the annual prizegiving on the morning of Saturday, November 11, of the Stanton Ironworks Company, Limited, and its associated companies. Sir Frederick Scopes, chairman of the company, presided; with him on the platform were Capt. L. S. Saunders, D.S.O., R.N. (lately director of training, Stewarts and Lloyds, Limited), Mr. N. C. Macdiarmid (managing director, Stanton), the Mayor of Ilkeston, Councillor P. E. Brown, and Mr. W. S. Matthews, J.P., B.SC. (Stanton's training officer).

The proceedings were opened by Sir Frederick and after his short address, Mr. Matthews presented the 43rd annual report on apprentice training. This of necessity was quite a lengthy account because it dealt with the work of the students employed in the four works and offices of the company over the year. During the course of the report, Mr. Matthews said that once again he was able to announce increases in the number of students and in the value of their awards (£2,972), continuing the trends of 1958. The total of 389 students was an increase of 16 compared with the previous session, this increase being mainly due to an increased recruitment of young men at the beginning of the session. Another most welcome increase was shown in the number of certificates gained, each one marking the successful completion of a course of studies. Altogether, Mr. Matthews said, 284 apprentices at Stanton had earned awards (an increase of 30 compared with last year's figure), in addition to 52 at the Holwell Works, 20 at the Riddings Works, and 33 at Cochranes. Concluding his report, Mr. Matthews acknowledged the encouragement and support the company's training department had received from the staff and works committees and from Mr. and Mrs. Wood, the hostel wardens, who for many years had been concerned with the welfare of young men coming from the more-distant works. He said he was also grateful for the support and co-operation of parents.

After Mr. Matthews had concluded his report, the chairman introduced Capt. L. S. Saunders who, following a short address, commenced the distribution of the awards.

List of Awards

Notable among special awards announced which were of interest to the foundry industry generally were the Joint Staff Committee Prize to B. M. Smith (research department, Stanton); Cochranes Joint Production Consultative and Advisory Committee Prize to R. Barton (apprentice patternmaker) (Cochranes Foremen's Association Prize also went to Mr. Barton); Holwell Works Committee Prize (senior) to J. R. Allen (apprentice patternmaker); Holwell Foremen's Association Prize to J. A. Pacey (apprentice patternmaker); Riddings Works Committee Prizes to T. Weightman (apprentice patternmaker) and J. A. E. Williams (apprentice moulder); Stanton Foremen's Association Prizes (foundry) to I. B. Worsfold (apprentice moulder, Riddings), and (woodwork) to G. Fogg (apprentice patternmaker, Stanton). Examination successes announced included advanced diploma (part 1) of the National Foundry College, to J. E. Crowe (Stanton), and diploma (part 1) to E. Marshall (Holwell); higher diploma in metallurgy, Constantine Technical College, C. Watson (Cochranes); certificate in foremanship and works supervision, British Institute of Management, P. N. Parker (Erewash Foundry); City and Guilds advanced certificates in foundry practice (2nd class) to R. Bowring (apprentice moulder, Stanton), G. A. Camm (apprentice patternmaker, Stanton), M. J. Clower (apprentice moulder, Stanton), and P. R. Harrison (apprentice moulder, Stanton); ordinary certificates in foundry practice (2nd class) to B. H. Hill (apprentice moulder, Riddings) and K. E. Johnson (moulder, Riddings); advanced certificates in patternmaking (2nd class) to J. R. Allen (apprentice patternmaker, Holwell), J. A. Pacey (apprentice patternmaker, Holwell) and T. Weightman (apprentice patternmaker, Riddings); ordinary certificates in patternmaking (2nd class) to J. P. Ibbottson (apprentice patternmaker, Cochranes), B. Myers (apprentice patternmaker, Stanton), and G. L. Wilkinson (apprentice patternmaker, Stanton).

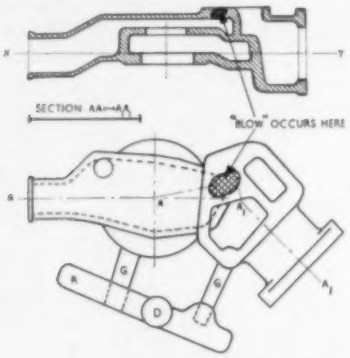
Following the distribution of awards, the Mayor of Ilkeston addressed the gathering and expressed his appreciation of the ceremony which had taken place and added his congratulations to the prizewinners. Mr. Macdiarmid proposed the vote of thanks to Capt. Saunders for coming along to present the awards and, finally, voiced the thanks of the firm and the whole gathering to the training staff for their efforts over the year and to the chairman for his continued help.

The upper picture shows Mr. G. Fogg (apprentice patternmaker, Stanton) receiving the Stanton Foremen's Association Prize from Capt. L. S. Saunders. In the centre is Mr. W. S. Matthews, Stanton's training officer. Below are four special-award winners from Riddings Works. From left to right, I. B. Worsfold (apprentice moulder), A. J. E. Williams (apprentice moulder), T. Weightman (apprentice patternmaker), and J. W. Bradley (apprentice turner) who was awarded the "Scopes" Cup.

Leaking Water-pump Castings

The following query has been submitted by a reader in India. Short replies, putting forward solutions to the problem, are invited.—EDITOR.

With the water-pump body casting sketched below and the gating system as indicated, we get blowholes in the castings. The average rejection percentage is very high, *viz.*, about 30 to 40 yet sometimes it comes down to 5 to 10 per cent., and then suddenly may shoot up as high as 50 per cent. The reason for the defect seems to be the top core "blowing" at its tip, causing the holes as shown.



Elevation and plan sketches of a water-pump casting giving trouble due to "blowing" at the location marked.

Key: (D) downgate (in cope) mean dia. 1 in.; (R) runner (in cope), $\frac{3}{4} \times \frac{3}{4} \times 1$-in. deep; (G) ingate (in drag), $\frac{3}{4}$-in. wide × $\frac{1}{4}$-in. deep; (XY) parting line.

We are making the cores by using a linseed-oil binder and are baking the core in a vertical-type core-oven. Metal is poured at between 1,360 and 1,400 deg. C. and is grey cast iron of composition TC 3.3 and Si 2.2 per cent. The casting is made in a greensand mould, the permeability of the sand being 4.5 per cent. Any help readers can give us through the JOURNAL towards curing the defect will be much appreciated.

POA Storekeeping Course

Consequent upon the interest shown in its examination course leading to a certificate of storekeeping, the Purchasing Officers' Association has decided, in future, to keep a register of all those who are awarded the certificate, and that all persons whose names remain on the register may be classified as certificated storekeepers, although not members of the Association. This innovation, amongst other benefits, will enable registered storekeepers to be attached to an existing POA branch and to attend three storekeeping meetings a year; they will have the right to consult POA headquarters on storekeeping problems and be eligible to use the appointments register service conducted by the Association. They will also be advised of any course in the stores field which may be sponsored by the POA.

MI Marketing Co-ordination

With a view to co-ordinating the marketing arrangements of a number of companies in the group, Metal Industries, Limited, is establishing 14 regional offices in the UK. They will each house the area sales engineers of Brookhirst Igranic, Limited, Lancashire Dynamo & Crypto, Limited, Lancashire Dynamo Electronic Products, Limited, Lancashire Dynamo Nevelin, Limited, Foster Transformers Limited, and, in some offices, J. G. Statter, Limited.

Regional managers are as follow:—Midlands, Mr. W. H. Soper; Mid-southern, Mr. W. Jones; Southwestern, Mr. W. J. Weston; South Wales, Mr. F. R. Williams; Scotland, Mr. W. J. A. Gemmell; Eastern, Mr. B. L. Perkins; N.E. Yorkshire, Mr. H. R. Renfree; Central London, Mr. E. G. Harrison; S.E. London, Mr. R. W. Puttock; N.W. London, Mr. B. G. Scott; Northwestern and North Wales, Mr. A. S. Brain; Northern, Mr. F. D. Gough; N.E. Midlands, Mr. F. W. Whiting; S.W. Yorkshire, Mr. S. T. Wood.

Mr. J. R. Morgan and Mr. W. A. Worton become steel industry specialists for the north and south, respectively, and Mr. F. Nye and Mr. K. B. Allan, marine specialists for the south and north, respectively. Newly appointed group consultants are Mr. H. J. Drummond (Manchester), Mr. F. B. Rose (Newcastle), and Mr. W. M. Hendry (Ipswich, Nottingham, and N.W. London).

Special-steels Congress in France

A technical congress having for its title "Special Steels in the Service of the Chemical Industry," held in Metz, France, on November 9, attracted some 200 participants. It was presided over by Mr. Robert Morizot, president and director of *Chambre Syndicale des Producteurs d'Aciers Fins et Spéciaux*, the French employers' federation for producers of special steels. The congress had the support of the *Société de Chimie Industrielle* and the local engineering societies. In addition to the technical discussions, delegates visited the new plants at Maizières-les-Metz of IRSID (the French iron and steel research association) and the continuous-casting plant installed at the works of S.A.F.E. at Hagondange, claimed to be the largest in the world. This congress typifies the efforts now being made to decentralize technical activities normally concentrated in Paris.

Selection and Training of Supervisors

In a report to the Ministry of Labour Committee, the British Employers' Confederation sets out what the various industries have accomplished, and hope to accomplish, in the direction of the selection and training of supervisors. Good notices are given in the report of the excellent work done by the British Iron and Steel Federation and the British Federation of Master Printers, but no mention is made of efforts of the Council of Ironfoundry Associations. (In the Editor's opinion the CFA activity in such matters is at a very high level and omission of mention of the CFA work in this report renders the latter incomplete to the point of being seriously misleading.)

PLATT METALS, LIMITED, Enfield, Middlesex, are pleased to be able to announce that the labour trouble they have had at their works for the past six months is now over. It has been a long and hard struggle and the firm say they are grateful to the many friends from whom they received co-operation during the troublous period.

Notes from the Branches

East Anglian Section

On the evening of October 27, the East Anglian section of the Institute of British Foundrymen held its first meeting of the current session in the Lecture Theatre of the Ipswich Civic College. Introducing Mr. K. Bolton, the new president, Mr. T. D. Oughton, the retiring president, paid tribute to the fact that not only was he a keen member of Council but for the past two years had also held the post of secretary and served well in that office.

Following his induction, Mr. Bolton said his presidential address was intended mainly for the younger members of the section, for its continued success lay in its "reserve team." The dearth of craftsmen must be remedied, he said, if we are to keep abreast and remain competitive. Although a first-class craftsman might not make a satisfactory leader, the fact of his being a craftsman must place him in the higher intelligence bracket. The required habits and skills could be acquired by combined study and practice and in this connection, the IBF and CFA training courses would help considerably.

Speaking of the L. J. Tibbenham Short-paper Competition, he said the response had not been too good, and reminded potential authors that members of the Council would be available to assist in presentation of the papers, and also to read the papers of the junior section. He hoped for greater interest in the competition, to make it one of the highlights of the session.

The meeting continued with a lecture on the "Use of Oxygen in Cupolas and Other Developments," by Dr. Harding and Mr. F. B. Lawrence of the British Oxygen Company, Limited. The lecture described how research was being conducted with a view to raising the efficiency of standard-type cupolas by various positioning of oxygen jets, the results being depicted on slides, together with tabulation of costs involved.

Photographed during the annual dinner and social evening of the East Anglian section of the London branch of the Institute (held on November 3) are (left to right), Mr. A. R. Parkes and Mr. Thos. Wills (president and honorary secretary respectively of the London branch); Mr. K. Bolton (president, East Anglian section), and Mr. V. W. Child (past-president, East Anglian section) who was responsible for the evening's arrangements.

(Courtesy: East Anglian Daily Times.)

Discussion

In the lively discussion which followed, Mr. Lawrence said that the making of oxygen on site would be economical only in very large works; two plants had been fitted up in the UK but these were not in daily use. Asked how the oxygen-enrichment process for cupolas compared with hot-blast, he said installation cost for the former was lower, and the rise in temperature and carbon was not so great as when using hot-blast cupolas. Oxygen was in fact used in some hot-blast cupolas, he added. Replying to a member who wanted to know how oxygen injection affected refractory life, Mr. Lawrence said that the refractory loss would be in proportion to the amount of metal melted, but possibly a greater quantity would be lost in the well. To other questions he replied that only by experience could the volume of oxygen be calculated to give definite total carbon results in the metal, and that oxygen *per se* had no effect on mechanical properties of the metal melted.

A vote of thanks to Dr. Harding and Mr. Lawrence, proposed by Mr. H. A. Wincer, concluded a very successful evening.

Coventry Section

The annual banquet and dance of the Coventry section was held on Friday, November 24, at the Hotel Leofric, Coventry, with more than 230 members, guests and their ladies attending. Receiving the company were the section president, Mr. J. Malin, and Mrs. Malin, the Rt. Rev. Cuthbert Bardsley, C.B.E., M.A., D.D., Bishop of Coventry, and Miss D. Bardsley, and Mr. D. A. Richards, national president, IBF, and Mrs. Richards. After the Loyal Toast, that of "The Institute of British Foundrymen and Coventry Section" was proposed by the Rt. Rev. Cuthbert Bardsley in a sparkling speech, and Mr. Malin responded. "The Guests" was proposed by Mr. B. R. Pearson, past-president, who mentioned amongst those present in addition to the Bishop of Coventry and the national president, the Birmingham branch president (Mr. D. P. Smith), Mr. G. Lambert (IBF secretary), Mr. E. Player, C.B.E., Mr. A. R. Parkes (president, London branch) and Dr. H. C. Smith (president, Coventry Technical College). Mr. D. A. Richards responded. Music during the banquet was supplied by the Barrie Phelps' Trio and dancing continued until 2 a.m. to the music of Barrie Phelps and the Hotel Leofric Orchestra. The joint masters of ceremonies were Mr. D. F. Bailey and Mr. D. R. Fardoe.

IFAC Congress

Newly-elected president of the Executive Council of the International Federation of Automatic Control (IFAC), is Professor E. Gerecke of Zurich; Mr. J. F. Coales, O.B.E., M.A., (Cambridge), and Professor P. J. Nowacki (Warsaw) have been elected vice-presidents. Following the success of IFAC's first International Congress for Automatic Control, in Moscow last year, preparations are now being made for the second Congress which is to be held in September 1963 in Basle, on the invitation of the Swiss Association for Automatic Control. British authors intending to present papers at the Congress are requested to write to the secretariat of the British Conference on Automation and Computation, c/o the Institution of Electrical Engineers, Savoy Place, London, W.C.2.

Film Reviews

Tool and Die Steels: 16-mm., sound/colour film produced by the staff of Jessop Saville, Limited, Brightside Works, Sheffield; running time 25 min.; loan applications to the Publicity Department.

Both lay and metallurgically minded audiences will be interested in this film. It is aptly introduced by a series of operations showing the use of tool steels in a variety of applications—pressure-die-casting, hot extrusion, hot stamping, plastic injection, moulding, compression moulding, and cold forming and trimming of sheet metal.

The film then traces the sequence of manufacture of tool and die steels—from the melting of the steel, through the many hot working and testing operations, to the inspection of the finished product. The concluding sequence shows how blocks of steel are transformed by the toolmaker into intricate dies and moulds.

History of the Oil Engine: 16-mm. or 35-mm. film produced by Random Film Productions, Limited, for Shell-Mex & B.P., Limited, and available on loan on application to Shell-Mex House, Strand, London, W.C.2.

"This is the story of an idea which began in Cologne in the year 1861" are the opening words of this film. In that year Nikolaus August Otto, a commercial traveller, dreamed of building a new kind of engine and fulfilled the dream with the creation of an atmospheric engine, the forerunner of the first four-stroke internal combustion engine, which he made in 1876.

The film story goes on to show how Herbert Akroyd-Stuart, the brothers Priestman, James Robson, and others all play their part, with Rudolf Diesel, in the invention of the compression-ignition engine. From Diesel to James McKechnie, with his discovery of a fuel pump; advances in metallurgy in the early twentieth century, which permitted higher piston speeds and increased temperatures; the researches of Sir Harry Ricardo, who paved the way for modern high-efficiency fuels and lubricating oils, and the growth of the oil industry, from Col. Drake's well in Pennsylvania to the laboratory technologists of the present day—all these are brought in to make a fascinating show.

The historical sequences are in black and white, but a short sequence at the end, dealing with modern uses of the oil engine, is in colour.

Industrial Films

The following new films are now available on loan from the Central Film Library, Government Building, Bromyard Avenue, Acton, London, W.3. It is to be noted that in addition to the hiring charges stated, a surcharge of 1s. 6d. per 16 mm. reel is being made to cover cost of despatch.

Fitting the Job to the Worker: (UK 1649), (three reels, running time 26 min., hiring charge 15s.). This is an introduction to ergonomics and the film demonstrates the influence of a man's working environment on his performance. The ways in which scientists and engineers combine to improve conditions and adapt tools to the needs of the men and women who use them, are illustrated by showing application to day-to-day problems in workshop and office—lighting, heat, noise, design of work-benches, etc.

Change and Employment: (UK 1667), (three reels, running time 27 min., hiring charge 15s.). This film is concerned with the effect of technological progress on employment security and how management and workers can meet the human problems involved. Examples are given of good management practice in overcoming employees' fears of redundancy, and avoiding, as far as possible, the hardship which may follow in the wake of labour-saving innovations.

The World Turns: (UK 2193), (three reels, running time 27 min., free of charge). A colour film sponsored by Colchester Lathes, Limited, showing the making of lathes in the company's works, including the complete sequence of operations involved in the making of bed and headstock, and selected aspects of the manufacture of the spindle and its bearing. Modern methods of continuous production and high standards of accuracy are demonstrated throughout.

This is Universal: (UK 2196), (two reels, running time 19 min., free of charge). The Universal Grinding Wheel Company, Limited, has produced this film, in colour, to show the making of grinding wheels and drills from bauxite, silicon carbide, and diamonds in their works. Processes shown include the fusing of aluminium oxide in furnaces, and the crushing, refining and sorting of the resultant material. The bonding of abrasive grains with vitrified clay, shellac or rubber, and how the wheels are pressed, finished, balanced and tested is also depicted.

Indian Foundries Face Closure

Foundries in Coimbatore, South India, are facing an acute shortage of coke and, if supplies are not immediately forthcoming, many of them might have to close down, according to the Southern India Engineering Manufacturers' Association.

The Association says that from the beginning of this year, even their inadequate coke allotments had not been fully supplied. Hitherto foundries have been making up the deficit with sea-borne coke, which is very expensive. With the irregular coastal shipping during the last six months and meagre rail-borne supplies, Coimbatore has been left with practically no stocks of coke for immediate consumption. Many foundries, now working with reduced labour and capacity, might have to close down in the next few days, it is stated.

The Association has sent a telegram to the Government of India and the State Government requesting that at least 500 tons of coke be rushed by rail to Coimbatore and that the Association be allotted 1,000 tons of coke from the shipments expected in Madras. There are 75 foundries in Coimbatore employing about 10,000 people and producing mainly textile machinery, machine-tools, electric motors, diesel-engines, power-driven pump-sets, agricultural implements, switches and starters. Some of these products are exported.

Coalbrookdale Museum a Success

The Coalbrookdale Works Museum, established in 1959 to commemorate 250 years of ironfounding on this site, has again enjoyed a successful season for visitors. In the seven months since being reopened in April, the museum has received over 2,800 in organized parties; other visitors have increased the total to well over 3,000 for 1961. School parties this year have numbered no fewer than 55.

Interest in the museum has not been confined to British residents, for visitors have come from as far away as Iceland, Nigeria, Malaya and America. While no Russian or Japanese visits have been recorded, correspondence about the museum and its industrial implications is being carried on with scientists of those two nations. Coalbrookdale—between Wellington and Ironbridge—remains an important ironfounding centre to this day, the Coalbrookdale Company, Limited, being a subsidiary of Allied Ironfounders, Limited.

Equipment and Supplies

Insulating Bricks

The production of lightweight vermiculite insulating bricks is being undertaken by Kingscliffe Insulating Products, Limited, the Wrexham member of the Marshalls Refractories group, of Sheffield. The bricks have a service temperature of 1,095 deg. C. and are available in two densities: 26 and 36 lb. per cu. ft. The basic material for their manufacture is vermiculite ore which is first exfoliated in an oil-fired furnace and then mixed with a special bond clay and formed into slabs or moulded shapes. These are dried and kilned, after which the slabs can be cut into bricks or machined to shape. These lightweight bricks and shapes can be applied as hot-face internal linings of industrial gas and electric heat-treatment furnaces, in removeable-cover furnaces and in large stress-relieving furnaces. Having good resistance to carbon-monoxide attack, the firm state that they are extensively used for lining carburizing and malleablizing furnaces.

Ventilators

A new series of powered roof-ventilators has been added to the "Airtec" range of ventilating and dust-control equipment manufactured by R. N. Watson, Limited, 207, Seymour Grove, Old Trafford, Manchester, 16. These units (Fig. 1) are made in a range of four standard sizes from 15 to 30 in., handling volumes of 1,000 to 8,500 cu. ft. of air per min., with larger units available as required. The units and fittings are constructed in heavy-gauge aluminium. Propeller fans provide the motive power and these are supported on resilient mountings. Totally-enclosed or flameproof motors are available for either single- or three-phase supply and access is gained through the hinged cowl which has a holding stay. The company also provides a technical service to assist customers in the selection of units.

Pallet Truck

A new design of pallet truck, to be named the "Vertopal" (Fig. 2), is announced by Powell & Company, Burry Port, Carmarthenshire. The truck lifts hydraulically from 3¼ in. to 7¼ in. and is manually operated. The push-rods controlling the lift are of box sections for maximum strength. The truck is said to be suitable both for single- or double-decked pallets, maximum capacity being 2,600 lb. Various sizes are available, overall widths being 21 or 27 in. and finger lengths 36 or 48 in. Reinforced plastic steering wheels and aluminium finger-wheels are fitted as standard equipment but cast-iron wheels can be supplied. The fingers are of high-tensile steel construction, the ends being tapered and inclined slightly downwards for easier entry. A feature claimed for the truck is its manoeuvrability, the distance between pallet and handle end of truck is 13 in., each finger has dual wheels and the twin steer wheels turn through 180 degrees plus and are articulated.

FIG. 1.—*One of the new series of powered roof ventilators manufactured by R. N. Watson, Limited, the model shown is mounted on a pitched roof, but units for flat roofs are also made as standard.*

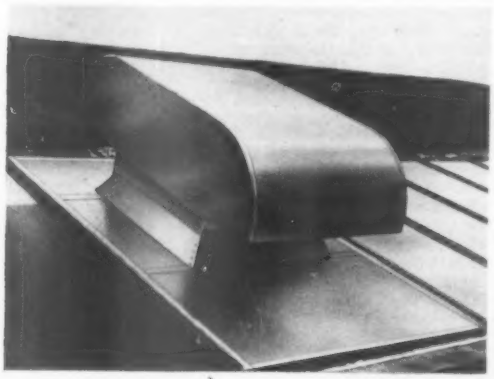


FIG. 2.—*"Vertopal" design of hydraulic pallet truck for which versatility and manoeuvrability are claimed as outstanding features (Powell & Company).*

Circular Sawing Machine. The Addison Tool Company, Limited, Marshalsea Road, London, S.E.1, have recently introduced a new type of metal-sawing machine to their range of industrial tools. Known as the Super Brown M1, the makers claim that the loss of time entailed by opening and closing of the vice is completely eliminated by the incorporation of a hydraulic semi-automatic unit. The machine has a maximum cutting capacity of 3 in., and is suitable for cutting rolled sections in ferrous and non-ferrous metals and presumably modifications of the machine could be adapted to removal of casting feeder-heads and runners. The unit has a two-speed pole-changing motor operating on 400/440-v., three-phase supply.

Turbines and Blowers: Coppus Engineering Corporation of Worcester, Mass., USA, announces the appointment of George Meller, Limited, 24, Fitzjohn's Avenue, London, N.W.3, as exclusive representatives in the British Isles. The American firm produces turbines and blowers for use with steam, compressed air, natural gas or process gas as the power medium. The turbines are claimed to be suitable for direct connection to many types of pumps, blowers, fans, compressors, stokers, mixers and special machines, with ratings ranging from one to about 250 h.p.

Fire Hose: A new fire hose—it incorporates a woven all-nylon jacket to which is fused a lining of PVC compound—has been developed by BTR Industries, Limited, Herga House, Vincent Square, London, S.W.1.

Resins: CIBA (A.R.L.), Limited, Duxford, Cambridge, announce further reductions in the prices of their epoxy resins.

News in Brief

THE 1962 DAILY MAIL IDEAL HOME EXHIBITION will open at Olympia on March 6 and close on March 31.

THE FIFTY-SEVENTH ANNUAL CANADIAN HARDWARE SHOW will be held in Toronto, Ontario, from February 5 to 8, 1962.

MOFFATS, LIMITED, a company of Avco of Canada, plan to lease premises in this country and start production of their range of Canadian electric cookers within the next six months.

IN THE FOUNDRY at the Trafford Park, Manchester works of Associated Electrical Industries, Limited, "a half of the top half" of a 550-mw. AEI turbine-cylinder was cast recently for the Central Electricity Generating Board's power-station at Thorpe Marsh.

THE SHOPS OF ROLLS-ROYCE, LIMITED, Derby, were visited on November 20 and 21 by nine scientists from Italy, Turkey, Iran, Norway and the Netherlands. The scientists are in this country attending a British Council course in stress analysis techniques.

THIS YEAR, Morganite Crucible, Limited—a member of the Morgan Crucible Group—has taken out the technical information usually included in the diary they issue, and has published the information in a separate booklet of the same size. For the receipt of both the diary and booklet, the JOURNAL expresses thanks.

THE FIRST of three cupola blast-heaters has left the works of Incandescent Heat Company, Limited, Smethwick, en route for Rumania. These units will supply preheated air to the melting plant Incandescent is manufacturing for the foundry being constructed by a consortium of British firms on a site near Bucharest. The heater will raise 5,000 cu. ft. per min. of air to 500 deg. C.

TO GIVE A CLEARER INDICATION OF ITS SCOPE, the Clean Air Exhibition, inaugurated in 1958 by the National Society for Clean Air and held in conjunction with its annual conferences, will in future be entitled the "Clean Air, Fuel Efficiency and Domestic Heating Exhibition." The Society's conference and exhibition will, next year, be held in Harrogate from October 9 to 12.

THOS. W. WARD, LIMITED, Sheffield, are to pay a bonus to more than 1,600 hourly-paid employees "in recognition of their contribution to the company's successful year." The bonus covers those who have been continuously employed by the company from January 1961. Men over 21 receive £12, men under 21 receive £6, and women receive £6. Employees serving in the Forces receive £6.

A SUMMARY of the *Proceedings* of the British Iron and Steel Research Association's Conference on "Heat-treatment Practice," held at the Old Swan Hotel, Harrogate, on July 5 and 6, 1960, is now available from 11, Park Lane, London, W.1, at a charge of £1 to non-members. The theme of the Conference was carburization and the summary comprises six papers on this general subject, together with reports of the subsequent discussions.

DAVID BROWN TRACTORS, LIMITED, announced on November 21 their range of new Implematic tractor series for 1962. It includes four general purpose machines and two narrow models designed primarily for vineyard, hopfield and orchard work. The new 990 Implematic is a four-cylinder 52 h.p. machine in the five-furrow class, and is powered by a three-litre Diesel engine of completely new design which is the result of five years' development work.

HARROW AND WEMBLEY PRODUCTIVITY ASSOCIATION are organizing a conference on the "Use of Photography in Work-study" to be held on January 18, 1962, in the Council Chamber of the Federation of British Industries, 21, Tothill Street, London. Applications for further details, reservations of tickets (two guineas each), should be made to the hon. secretary of the Association, Mr. A. G. Sells, industrial engineering department, Kodak, Limited, Harrow, Middlesex.

ACCORDING TO FIGURES published by the Dutch Central Office of Statistics, output of pig-iron rose to 752,200 tons in the first half of this year from 650,500 tons (an increase of 15 per cent.) and raw steel production rose 9 per cent. from 953,900 tons to 1,031,900 tons. Output of rolled-steel goods was 3 per cent. higher at 741,900 tons (721,300 tons last year) and output of iron foundries amounted to 111,800 tons (107,700 tons), an increase of 4 per cent.

A 50,000 SQ. FT. ADVANCE FACTORY on the Ministry of Commerce industrial estate at Monkstown, near Belfast, is to be leased to Standard Telephones & Cables, Limited, for the production of telephones and telephone-exchange equipment. The firm plan to occupy the factory immediately and later take possession of a 150,000 sq. ft. factory to be built by the Ministry on the same estate. It is anticipated that the larger factory will eventually be double in size.

DAVID BROWN FOUNDRIES DIVISION at Penistone, near Sheffield, are doubling the space available for the manufacture of pumps, following the success resulting from the agreement signed in 1960 with the Bingham Pump Company of Portland, Oregon, United States. By this, pumps to the design of the American company are manufactured and marketed by the Foundries Division of David Brown Industries, Limited. Several new machine-tools are being installed at Penistone, including a dynamic balancing machine.

THE GREY-IRON FOUNDRY at the Rourkela steel plant in India has succeeded in casting a huge 10-ton slag pot, an achievement at first thought to be beyond its capacity. It is the first time a slag pot has been made in India using the drysand method, instead of the conventional loam/sand method of manufacture. The casting was produced in 28 days, all tools and tackle being designed and made in the patternshop and on the foundry floor. Manufacture had to be undertaken because of long-delivery dates promised on new units.

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News in Brief

THE 1962 DAILY MAIL IDEAL HOME EXHIBITION will open at Olympia on March 6 and close on March 31.

THE FIFTY-SEVENTH ANNUAL CANADIAN HARDWARE SHOW will be held in Toronto, Ontario, from February 5 to 8, 1962.

MOFFATS, LIMITED, a company of Avco of Canada, plan to lease premises in this country and start production of their range of Canadian electric cookers within the next six months.

IN THE FOUNDRY at the Trafford Park, Manchester works of Associated Electrical Industries, Limited, "a half of the top half" of a 550-mw. AEI turbine-cylinder was cast recently for the Central Electricity Generating Board's power-station at Thorpe Marsh.

THE SHOPS OF ROLLS-ROYCE, LIMITED, Derby, were visited on November 20 and 21 by nine scientists from Italy, Turkey, Iran, Norway and the Netherlands. The scientists are in this country attending a British Council course in stress analysis techniques.

THIS YEAR, Morganite Crucible, Limited—a member of the Morgan Crucible Group—has taken out the technical information usually included in the diary they issue, and has published the information in a separate booklet of the same size. For the receipt of both the diary and booklet, the JOURNAL expresses thanks.

THE FIRST of three cupola blast-heaters has left the works of Incandescent Heat Company, Limited, Smethwick, en route for Rumania. These units will supply preheated air to the melting plant Incandescent is manufacturing for the foundry being constructed by a consortium of British firms on a site near Bucharest. The heater will raise 5,000 cu. ft. per min. of air to 500 deg. C.

TO GIVE A CLEARER INDICATION OF ITS SCOPE, the Clean Air Exhibition, inaugurated in 1958 by the National Society for Clean Air and held in conjunction with its annual conferences, will in future be entitled the "Clean Air, Fuel Efficiency and Domestic Heating Exhibition." The Society's conference and exhibition will, next year, be held in Harrogate from October 9 to 12.

THOS. W. WARD, LIMITED, Sheffield, are to pay a bonus to more than 1,600 hourly-paid employees "in recognition of their contribution to the company's successful year." The bonus covers those who have been continuously employed by the company from January 1961. Men over 21 receive £12, men under 21 receive £6, and women receive £6. Employees serving in the Forces receive £6.

A SUMMARY of the *Proceedings* of the British Iron and Steel Research Association's Conference on "Heat-treatment Practice," held at the Old Swan Hotel, Harrogate, on July 5 and 6, 1960, is now available from 11, Park Lane, London, W.1, at a charge of £1 to non-members. The theme of the Conference was carburization and the summary comprises six papers on this general subject, together with reports of the subsequent discussions.

DAVID BROWN TRACTORS, LIMITED, announced on November 21 their range of new Implematic tractor series for 1962. It includes four general purpose machines and two narrow models designed primarily for vineyard, hopfield and orchard work. The new 990 Implematic is a four-cylinder 52 h.p. machine in the five-furrow class, and is powered by a three-litre Diesel engine of completely new design which is the result of five years' development work.

HARROW AND WEMBLEY PRODUCTIVITY ASSOCIATION are organizing a conference on the "Use of Photography in Work-study" to be held on January 18, 1962, in the Council Chamber of the Federation of British Industries, 21, Tothill Street, London. Applications for further details, reservations of tickets (two guineas each), should be made to the hon. secretary of the Association, Mr. A. G. Sells, industrial engineering department, Kodak, Limited, Harrow, Middlesex.

ACCORDING TO FIGURES published by the Dutch Central Office of Statistics, output of pig-iron rose to 752,200 tons in the first half of this year from 650,500 tons (an increase of 15 per cent.) and raw steel production rose 9 per cent. from 953,900 tons to 1,031,900 tons. Output of rolled-steel goods was 3 per cent. higher at 741,900 tons (721,300 tons last year) and output of iron foundries amounted to 111,800 tons (107,700 tons), an increase of 4 per cent.

A 50,000 SQ. FT. ADVANCE FACTORY on the Ministry of Commerce industrial estate at Monkstown, near Belfast, is to be leased to Standard Telephones & Cables, Limited, for the production of telephones and telephone-exchange equipment. The firm plan to occupy the factory immediately and later take possession of a 150,000 sq. ft. factory to be built by the Ministry on the same estate. It is anticipated that the larger factory will eventually be double in size.

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New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.).

857,377. International Nickel (Mond), Limited, Thames House, Millbank, London, S.W.1.

A lining for a mould which comprises a smooth gas-permeable facing of refractory powder of particle size of less than 250 microns bonded to a backing of fibrous glassy material and preferably from 25 to 35 per cent. voids, by volume, so that gas may pass through it.

857,824/825. Badische Maschinenfabrik, A.G., Seboldwerk, Karlsruhe-Durlach, Germany.

Apparatus for passing moulding boxes from a roller conveyor to a circular conveyor and *vice-versa.*

858,143. Karl Albasser, 2, Karl Morrestrasse, Kapfenberg-Hafendorf, Steiermark, Germany.

Improvement in foundry-mould carriers.

858,298. Foundry Services International, Limited, 285, Long Acre, Nechells, Birmingham, 7.

Production of ingots in "wide-end-down" moulds with particular reference to processes wherein the feeding of the mould is assisted by means of an exothermic composition—such as one containing aluminium, an oxidizing agent and a small proportion of a fluoride (see also B.P.s 627,678, 769,719, FOUNDRY TRADE JOURNAL, April 25, 1957, 774,490/1, and 812,583).

859,826/7. British Iron and Steel Research Association, 11, Park Lane, London, W.1.

Containers for use during the casting of molten metal. These have at least one delivery outlet extending between the interior of the container and the exterior. This outlet includes a metering nozzle to regulate the flow of metal from it. Between the metering nozzle and the exterior of the container wall is a tubular heat-shield. There is thus formed an intermediate chamber of greater temperature than that of the bores of both the metering nozzle and the heat shield. In co-patent, **859,827,** the Association claim a plug for closing outlet openings of tundish or similar containers for liquid metal—particularly of molten steel.

860,044. Floodgate Steel Fabricating Company, Limited, 758-786, Kingsbury Road, Erdington, Birmingham, 24.

Apparatus for assembling the cope and drag halves of a mould box.

860,076. National Lead Company, 111, Broadway, New York, USA.

A casting die capable of being perfectly aligned and maintained in alignment when the two sections are mounted together.

860,126. Henry Wiggin & Company, Limited, Thames House, Millbank, London, S.W.1.

Production of hollow metal articles. The inventors cast the metal round a preformed insert to form a billet and reduce the grain-size of the metal while it is solidifving. The cast billet is then hot worked to form a blank for the final product with reduction in the cross-sectional size of the billet. Subsequently the insert is removed. Alternatively the insert may serve simply to shape the holes and may then be removed to allow a filler of the desired flow characteristics to be introduced into the holes.

860,635. International Minerals and Chemical Corporation, 5401 Old Orchard Road, Skokie, Illinois, USA.

A foundry corebinder with especially good hot properties composed of phosphate modified amylose. This is obtained by impregnating gelatinized amylose with an aqueous alkali-metal orthophosphate solution. The resultant mixture is dried to a moisture content less than about 15 per cent by weight, and then is heated to a temperature between 125 and 200 deg. C.

860,646. Volkswagenwerk G.m.b.H., Wolfsburg, Germany.

Method and apparatus for producing moulds or mould parts for casting. A great advantage of the apparatus claimed is that it enables mould parts, etc., to be produced automatically by means of the conveyor-belt system in accordance with the deposit method, but with a deposit only sufficient for the wall-thickness of the moulding mask.

Australian Patents

Photostat copies of the following Australian Patents are available from the UK Patent Office, price 9d. per page. The address given is that of the agent for Service.

229,541. Combustion Engineering, Inc., Spruson and Ferguson, Caltex House, 167, Kent Street, Sydney, New South Wales. (47 sheets.)

New and improved facilities for stripping the cores from poured moulds and for turning the drags over in mould-assembly installations. Broadly stated, the objective of the invention is to provide a method which is more compact than, and more fully automated than, present-known methods.

229,793. Bendix Aviation Corporation, F. B. Rice & Company, 134, King Street, Sydney, New South Wales. (11 sheets.)

Circular composite castings such as a rotor. The Patent deals mainly with the assembly of inserts in the castings.

229,795. Madison-Kipp Corporation, W. S. Bayston & Son, 306, Little Collins Street, Melbourne, Victoria. (16 sheets.)

Devices for removing air and other gases from the die-cavity of machines during the metal-shooting operation.

230,129. Glyco-Metallwerke Daelen and Loos G.m.b.H., Spruson & Ferguson, Caltex House, 167, Kent Street, Sydney, New South Wales. (8 sheets.)

Method and apparatus for continuous integral casting of metal alloys. This applies particularly to the casting of lead-bronze on to steel bands for the manufacturing of bearing bushings, bearing shells and like articles. The steel band is passed through an inductively-heated gas-tight glow muffle—the steel band is then heated by means of indirect heating through radiation as well as by the additional heating from induction directly up to approximately 1,100 deg. C.

230,250. Imperial Chemical Industries, Limited, Phillips, Ormonde Le Plastrier & Nelson, 37-41, Queen Street, Melbourne, Victoria. (13 sheets.)

Apparatus for the non-destructive detection of flaws in metals.

230,478. Hazelett Strip-casting Corporation, Phillips, Ormonde Le Plastrier & Nelson, 37-41, Queen Street, Melbourne, Victoria. (74 sheets.)

Apparatus for casting molten metal into slabs or strips.

Personal

Mr. H. R. SYKES has been appointed treasurer of the Steetley Company, Limited.

Mr. D. A. WHYATT has been appointed group marketing manager of the Amber group of companies.

Mr. W. BANKS and Mr. A. YOUNG have been appointed special directors of Colvilles, Limited, Motherwell.

Mr. C. M. RISK has been appointed secretary of Sir Wm. Arrol & Company, Limited, following the recent death of Mr. W. S. GRAY.

Mr. THOMAS HAIG, who has retired after 47 years' service at the age of 69 from Chattan Foundry, Bonnybridge, received monetary gifts from the directors, staff and employees.

Mr. S. WARD, formerly foundry superintendent of Hamworthy Engineering, Limited, Newtown, Parkstone, Dorset, has been appointed foundry manager in succession to the late Mr. E. KAY.

Professor A. G. QUARRELL, head of the metallurgy department at Sheffield University, is leading a team of four professors of metallurgy on a visit to Russia. The party left by air on November 18.

Mr. R. HIGGINS, formerly foundry manager of Thomas Robinson & Son Limited, Rochdale, has been appointed foundry manager of H. Hewins, Limited, Port Foundry, Brimscombe, Stroud, Glos.

Mr. E. A. D. DUMAYNE (70) (who was employed at the Newport (Mon) works of the Isca Foundry Company, Limited, for 27 years) and Mrs. Dumayne have celebrated their golden wedding anniversary.

Mr. F. V. BARKER, a director of Vauxhall Motors, Limited, since 1955, is to resign from the board at the end of this month, when he will be retiring under the terms of the company's retirement programme.

Mr. W. F. PRESTWICH, former managing director of the Gosforth Foundry Company, Limited, Dronfield, Derbyshire, has been appointed head of Senior Staff Consultants (Northern), Limited, Fargate, Sheffield—the city's first staff consultancy firm.

Mr. VERNON H. WILLEY has been appointed by Firth Cleveland Steel, Limited, to a special post with the company as marketing manager—stainless steels. He will continue as director and general manager of the Edmonton Steel Strip Company, Limited.

Mr. JOSEPH SAMUELS, a director of Winston Electronics, Limited, Shepperton, Middlesex, has been appointed managing director of the company. Mr. W. ALLEN BRIDGES continues as chairman but relinquishes the managing directorship which he assumed last August.

Mr. GEORGE H. MUTCH, managing director, Hatchett & Company, Limited, constructional engineers, Kingston Works, Hyde, Cheshire, has been appointed to the additional post of deputy managing director of the parent company, Daniel Adamson & Company, Limited, ironfounders, Dukinfield, Cheshire.

THE TWO latest employees of Brightside Foundry & Engineering Company, Limited, Ecclesfield, to receive awards to mark completion of 40 years' service with the company, are Mr. GEORGE A. HOBSON, a fitter in the Ecclesfield machine shop, and Mr. GEORGE W. HANCOCK, of the maintenance department at Newhall Works.

Mr. I. FELDMAN, production manager, and Mr. R. J. TREFUSIS, sales manager of the meters division of the United Gas Industries group, have been appointed, with effect from December 1, to the board of UGI's subsidiaries, Smith Meters, Limited, U.G.I. (Meters), Limited, Metal Units, Limited, and Alder & Mackay, Limited.

Mr. JOHN BOOT on his recent retirement after 60 years with Wootton Bros., Limited, engineers, brass and ironfounders, Coalville, near Leicester, received a cheque from the principal of the firm, Mr. Tom Wootton, senior. Mr. Boot joined the firm on December 31, 1900, later becoming a draughtsman and then chief estimator.

Mr. C. F. WILLIAMSON has been appointed sales manager of the compressor division of Tilghman's, Limited, a member of the Staveley group of companies. Mr. R. BUSHELL has been appointed sales representative for the Lancashire and Yorkshire area, Mr. A. H. STENNING (London), and Mr. J. SMITH (North East Coast and Scotland).

Mr. R. S. BUSHNELL has been appointed manager of the corebinder division of Foseco International, Limited. This newly-formed division will be responsible for servicing both the licencees and agents of Foseco/Fordath A.G., a company which has been formed following upon the recent agreement between Foseco International, Limited, and Fordath Engineering Company, Limited.

Mr. J. G. PETTER, director of Cincinnati Milling Machines, has been elected vice-president of the Machine Tool Trades Association. He succeeds Mr. J. P. HUNT, chairman of Staveley Industries, Limited, who has resigned as vice-president. Mr. T. H. H. Skeet, Conservative M.P. for Willesden East, has accepted an invitation to serve on the Association's economic policy committee.

Stanley Works (G.B.), Limited, tool manufacturers, have appointed Mr. RONALD SHELTON, product designer, to head a new department responsible for the design and development of new products. Mr. ROBERT BRADLEY, formerly chief planning engineer, has been appointed manager of the engineering department. Mr. LAURENCE FORD, chief engineer, is leaving the company to take up a new appointment.

Mr. R. E. FORD has been appointed managing director of International Minerals & Chemicals, Limited, due to the return of Mr. W. T. BRADLEY to the US, where he has taken up an appointment with the American parent company in Skokie, Illinois. Mr. JOHN LEYDEN, who is a director of Tororo Industrial Chemicals and Fertilisers, Uganda, and Williamson Diamonds, Tanganyika, has been appointed to the board of International Minerals.

Dr. M. F. KAPLAN, of Pretoria, has been appointed research director of the Civil Engineering Research Council in London. He will be taking up his appointment in February. He is at present head of the civil engineering division of the Council for Scientific and Industrial Research in South Africa. The Civil Engineering Research Council was established earlier this year by the Institution of Civil Engineers, the Federation of Civil Engineering Contractors and the Association of Consulting Engineers.

Mr. A. G. SHAKESPEARE, who has been in charge of BISRA's work on hot-strip processing at the Sketty Hall laboratories in Swansea, has been appointed head of the steelmaking laboratories at BISRA's research station in Sheffield. He succeeds Mr. G. FENTON, who has joined Foundry Services International, Limited. He worked in research with Fairey Aviation and the English Electric Company before joining BISRA in 1954. He has taken an important part in the development of BISRA's new rapid continuous-annealing process.

Company News

Samuel Osborn & Company, Limited

Signs of a general slackening of trade in many of the group's main activities have appeared recently, states Mr. F. A. Hurst, chairman of Samuel Osborn & Company, Limited, makers of special steels, steel castings, and engineers' tools, of Sheffield, in the report of the group's record year to July 31, 1961. The UK manufacturing companies have in particular been affected, it is stated. This trend has not yet shown itself on the shop floor, where the group is still very busy, but the intake of orders has slowed down in the last month or so.

Mr. Hurst says that this was inevitable, as pressure of work has resulted in the lengthening of delivery forecasts, and where customers could not wait they have had to place their orders elsewhere. He stresses, however, that the group remained very busy at a time when it seemed that some of its competitors had suffered a certain amount of recession.

During the year new plant was added and extensions made, and it is hoped that by these means and "by the fortunate position we occupy due to the diversification of our manufactures, our prosperity will be maintained." Over £500,000 was incurred in capital expenditure during the year bringing the total for the last five years to more than £2,000,000. Expenditure on a heavy scale must continue, says the chairman. Year-end commitments totalled £400,000 (£300,000). The previous sales record was beaten in 1960-61 by a substantial margin, direct exports improved, and profits were also at a record level, it is stated.

BROOM & WADE, LIMITED, makers of air compressors, pneumatic tools, etc., of High Wycombe (Bucks)—The final dividend is maintained at 17½ per cent., as forecast, on capital increased by a one-for-six rights issue. Group profits amounted to £971,637 (£1,044,922) for the year to September 30, 1961.

S. SMITH & SONS (ENGLAND), LIMITED—More working capital is needed, says Mr. R. Gordon-Smith, the chairman, and it will be achieved by raising money on fixed interest terms, the policy being to restore balance between fixed and equity capital more appropriate to the pattern of the business.

A.E.I.-JOHN THOMPSON NUCLEAR ENERGY COMPANY, LIMITED—Already holding 50 per cent. of the shares of Nuclear Graphite, Limited, the company is to acquire the other 50 per cent. from the Morgan Crucible Company, Limited, which, however, will continue to have wide interests in the nuclear field.

W. E. NORTON (HOLDINGS), LIMITED, machine tool merchants, of London, S.W.1—Made public in September 1960, the company has declared an interim dividend of 7½ per cent. in respect of the year ending March 31, 1962. A similar payment was made on £55,748 of the £100,000 capital for the initial period from September 23, 1960, to March 31, 1961.

WOLVERHAMPTON DIE CASTING COMPANY, LIMITED—Group profits contracted to £131,258 (£250,433) in the year to June 30, 1961, and the dividend is cut to 30 (35) per cent. The chairman, Mr. W. C. Sproson, states that the revival in the motor and consumer industries proved both slight and temporary and the difficult trading conditions are continuing.

GLOUCESTER RAILWAY CARRIAGE & WAGON COMPANY, LIMITED—The chairman, Gen. Sir William Morgan, states that he will shortly be sending a letter to shareholders giving the board's comments on the offer by Winget, Limited. Holders are strongly recommended to take no action until they have been informed of certain facts which have an important bearing on the proposals.

CRONITE FOUNDRY COMPANY, LIMITED, nickel/chromium-alloy manufacturers and founders, of London, N.15—Final dividend is declared at 12 per cent., as forecast, making 18 per cent. (16 per cent. equivalent) for the year to September 30, 1961. Net profit was £46,663 (£56,663) after depreciation and tax charges, and including adjustments on provisions for the previous year.

NORCROS, LIMITED. The group has purchased the entire issued ordinary share capital of Aluminium Ingot Makers, Limited, Yeadon, near Leeds. The purchase price of £10,662 has been satisfied as to £662 in cash and the balance by allotment, fully paid, of 12,500 ordinary shares of 5s. each in Norcros. Norcros, Limited, has also loaned the company £29,338 to liquidate a loan from the major shareholders.

SAUNDERS VALVE COMPANY, LIMITED—The interim dividend is increased from the equivalent of 5 per cent. to 7½ per cent. It is proposed to make a one-for-three scrip issue, the purpose of which is to increase the capital to £1,000,000 to qualify the shares for Trustee status under the 1961 Act. The issue, which will necessitate capitalization of £250,000, does not indicate that the amount of future dividends will be affected, it is stated.

ENGLISH ELECTRIC COMPANY, LIMITED—In a circular to ordinary shareholders, Lord Nelson of Stafford (chairman), states that while results will not be known with precision until next February, members should know that, although turnover has increased during the year and the volume of new orders overall has been maintained, there has been a further deterioration in margins at home and overseas and the expected improvement at D. Napier & Son, Limited, has not materialized.

HERBERT MORRIS, LIMITED, lifting and transporting machinery manufacturers, of Loughborough (Leics)—The chairman, Mr. F. Morris, hopes that the current year's profit will be "no less favourable" than that for the year to July 31, 1961. The shortage of skilled labour has become less acute, which will enable the company to increase production. Regarding exports, the directors are considering ways and means of taking advantage of the increased opportunity for sales in Europe in the event of Britain entering the Common Market.

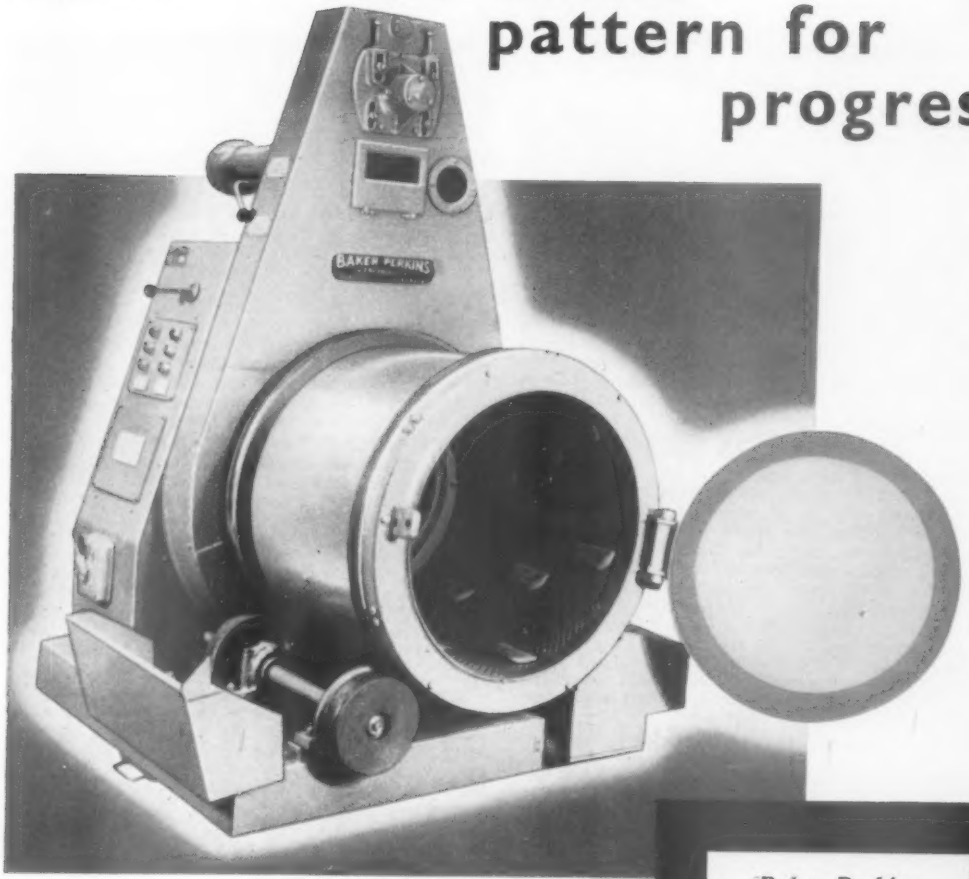
Development of Technical Training

The rapid development of the United Kingdom's technical training programme is illustrated by the Minister of Education's latest edition of List 182 ("List of Sandwich Courses and Block Release Courses")*, published last month, in which is listed more than three times as many block-release courses for 1961-62 compared with 1960-61.

The new list gives particulars of the 374 sandwich courses (332 last year) and of the 138 block-release courses now being offered at colleges of advanced technology and technical colleges. About a third of the sandwich courses now available lead to the award of the Diploma in Technology or to a university degree, and a similar proportion to higher national diplomas.

*Available from Her Majesty's Stationery Office, York House, Kingsway, London, W.C.2; price 6s.

pattern for progress



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BP/F17

Raw Material Markets

Iron and Steel

Unfortunately there is no sign up to the present of any better state of affairs in the foundries, and many are of the opinion that no improvement will set in this year. The light foundry trade dealing with builders' castings are finding orders slowing down, but business in castings for heating stoves, hot-water boilers, etc., is fairly well engaged.

There is no difficulty whatever in getting supplies of foundry pig-iron for all purposes. The makers of hematite, low, and high phosphorus irons have appreciable stocks and much larger supplies could be obtained as plants are not fully extended. With trading conditions very patchy it is not surprising that consumers are ordering on a hand-to-mouth policy, there being no inducement at all to buy forward. Nor is there any trouble in securing requirements in foundry coke, ganister, and limestone. Apart from very special grades, there is no difficulty in getting full tonnages of scrap, in fact the increased use of scrap at the foundries is very apparent.

The makers of billets could do with considerably more business than is at present forthcoming. Re-rollers are keeping their stocks to a minimum level. They are short of orders for their products in small bars, light sections, and strip and there is no immediate prospect of a change in the situation. The demand for reinforcing bars, which has kept at a very good level for many months, has now eased considerably and prompt rollings can be secured.

Owing to the depressed state of the re-rolling industry some of the steelworks are finding themselves accumulating supplies of defective billets and crops.

Non-ferrous Metals

Copper stocks in London fell by a modest 126 tons to 15,089 tons last week. This reduction went almost unnoticed, and markets on both sides of the Atlantic have been without feature. The London quotation continues to move narrowly either side of £228 a ton and the US price is still called at 31 cents a pound.

Tin, too, has been dull in New York and London, although Singapore shows signs of recovering. Stocks in London rose by 11 tons to 4,346 tons and the market encountered some selling pressure which was enough to drop the price sharply. This market continues to be sensitive and fluctuations are relatively wide on either side of £960 a ton.

Lead stocks in London rose by as much as 910 tons last week and this was enough to make for a weak market. Yet, because of their depressed price levels, lead and zinc gained most from the short-lived rumour of talks of devaluing sterling. In fact, the London price went up over £60 a ton and is trying hard to stay there. In the US the market is flat and the price unchanged at 10 cents a pound.

Zinc stocks last week in London also increased but, like lead, early losses were recovered following the devaluation rumour which revived consumer interest and enabled the quotation to go up over £70 a ton. In the US the market is without feature and the price unaltered at 11½ cents a pound.

BRIGHTSIDE HEATING & ENGINEERING COMPANY, LIMITED, Sheffield, has received an order to supply heating and ventilating services to the office-block extensions of Shepcote Lane Rolling Mills, Limited, Sheffield.

Scottish Group Training Scheme

Scottish Mechanical Engineers Training Association (SMETA) has been formed to undertake a co-operative training programme for six member-firms, namely John Dalglish & Sons, Limited, Davy and United Engineering Company, Limited, Lang Gisholt Engineering Company, Limited, Mirrlees Watson Company, Limited, Murray & Paterson, Limited, and Scottish Machine Tool Corporation, Limited. Training will be carried out over a two-year post-graduate period and aims at membership of the Institution of Mechanical Engineers as a logical completion of the process of training. The programme involves first an initial period of training, to be done in part or whole during university or college vocations, covering all the basic groundwork. Thereafter, the trainees will go on to advanced aspects, including design and development, research, estimating, purchasing, costing, selling organization, administration and management. Each trainee will have opportunity during the period of education to sample work within the varied units concerned.

The scheme has some of the characteristics of the earlier Scottish Electrical Training Scheme, which has been so very great a success in electrical engineering. It fulfils much of the same function, uses much of the same technique, but is concerned with only a small part of the total industry—which may be inevitable in any such scheme. However, the six firms sponsoring the scheme represent a very considerable variety of skills and activities and will be able to provide their graduate trainees with a very full pattern of work. Machine-tools are strongly featured although the scheme is by no means confined to this aspect.

Scope for enlarging on these early developments has been demonstrated in the SETS scheme where a few other firms joined after the scheme was launched. Much of the value of the scheme lies in the fact that the people who are paying the bills are responsible for the training of graduates whom they will ultimately employ; with that evidence before it, the new SMETA project is off to a good start. Organizing secretary of the scheme is Dr. J. C. Morrison, 126, Clevedon Road, Glasgow, W.2.

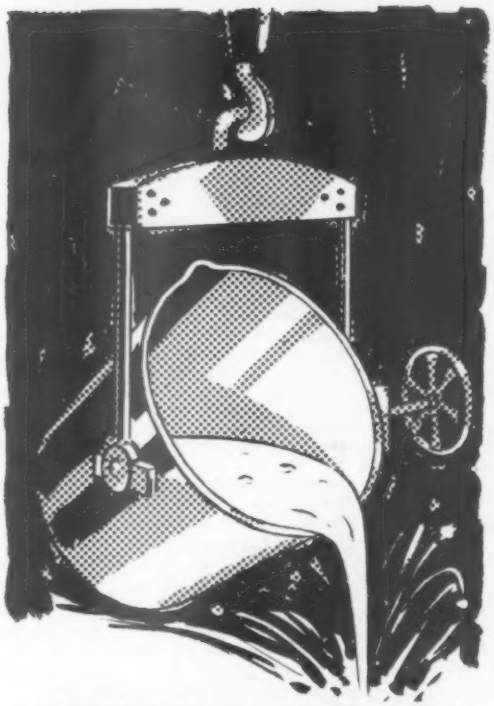
House Organs

The Forge, No. 16. Published by the Brockhouse Organization, from 25, Hanover Square, London, W.1.

This issue deals with the apprentice training scheme which the group operates. This would seem to conform to the best practice now associated with the engineering industries, but unless the word "etc." includes foundry practice, then this section is being neglected. That such a section is indeed important to the group is shown by the inclusion in the magazine of a well-illustrated description of the mechanized foundry installed at one of their susbidiaries, R. J. Hunt & Son.

Saunders Magazine, Autumn 1961. Published by the Saunders Valve Company, Limited, Cwmbran, Mon.

This magazine is designed to inform customers and agents as to what is happening at the works and the efforts made by the company to publicize its products. Interpreting this theme, a sales conference with overseas participation and the displays of the company at various exhibitions are well covered.



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Current Prices of Iron, Steel, and Non-ferrous Metals

(Basis prices, delivered unless otherwise stated. Prices following side headings marked* are subject to an increase of 1 per cent. under Iron and Steel Board Price Determination, 1961, No. 2.)

November 29, 1961

PIG-IRON

* **Foundry Iron.**—No. 3 IRON, CLASS 2, 10-ton lots or over, Middlesbrough, £21 17s. 0d.; Birmingham, £21 9s. 3d.

* **Low-phosphorus Iron.**—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham; £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.; North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

* **Hematite.**—Si less than 2 per cent, S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 9s. 0d.; Birmingham, £25 13s. 0d.; South Wales (Welsh iron), £23 19s. 0d.

* **Basic Pig-iron.**—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(per ton unless otherwise stated, delivered)

Ferro-Silicon (6-ton lots and over).—45 per cent. Si, £45 0s. 0d. to £48 0s. 0d., scale 15s. 0d. per unit, lumpy, 75 per cent. Si, £62 10s. 0d. to £66 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 14s.1d. per lb. of Mo

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 9s. 1d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 12s. 1d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £80 10s. 0d. to £84 10s. 0d., basis 60 per cent. Cr scale 27s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £79 0s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale, 27s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr.; 0.10 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.06 per cent. C,* 1s. 10½d. to 2s. 1d. per lb. Cr. * Average 68-70 per cent.

Metallic Chromium.—98/99 per cent., 6s. 9d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £275 0s. 0d.; 96/98 per cent., £285 0s. 0d.

Ferro-columbium.—65/67 per cent. Cb + Ta, 19s. 0d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £58 10s. 0d.

SEMI-FINISHED STEEL

* **Re-rolling Billets, Blooms, and Slabs.**—BASIC: Soft u.t., 100 tons and over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 100 tons and over, £32 5s. 6d.; hard (0.41 to 0.60 per cent. C), 50 tons and over, £33 17s. 0d.; silico-manganese, 50 tons and over, £42 16s. 6d.; free-cutting, 50 tons and over, £35 4s. 6d. SIEMENS MARTIN ACID (50 tons and over): Up 0.25 per cent. C; £40 11s. 0d.; silico-manganese, £43 4s. 0 l

* **Billets, Blooms, and Slabs for Forging and for Stamping** 50 tons and over).—BASIC: Soft, up to 0.33 per cent. C, £37 0s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £38 2s. 6d.; acid, up to 0.25 per cent. C, £41 14s. 0d.

FINISHED STEEL

* **Heavy Plates and Sections** (50 tons and over).—Ship plate (N.-E. Coast), £40 7s. 0d.; boiler plates (N.-E. Coast), £42 17s. 0d.; floor plates (N.-E. Coast), £41 16s. 0d.; angles (N.-E. Coast), £38 1s. 6d.; joists (N.-E. Coast), £37 17s. 6d.

* **Small Bars, Sheets, etc.**—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 6d.; under 4 tons to 2 tons, £41 3s. 6d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £67 4s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £67 16s. 0d.; nickel-chrome, £100 18s. 0d.; nickel-chrome-molybdenum, £113 11s. 0d., in lots of 25 tons and over.

NON-FERROUS METALS

Copper.—Cash, £227 10s. 0d. to £227 15s. 0d.; three months, £228 0s. 0d. to £228 5s. 0d.; settlement, £227 15s. 0d.

Copper, Tubes, etc.—Solid-drawn tubes, 2s. 2½d. per lb. rods, 243s. 6d. per cwt. basis; 20 s.w.g., 278s. 6d. per cwt.

Tin.—Cash, £949 0s. 0d. to £950 0s. 0d.; three months £961 0s. 0d. to £962 0s. 0d.; settlement, £950 0s. 0d.

Lead (Refined Pig).—Second half November, £61 2s. 6d. to £61 5s. 0d.; second half February £62 2s. 6d. to £62 5s. 0d. settlement, £61 5s. 0d.

Zinc.—Second half November, £71 7s. 6d. to £71 10s. 0d., second half February, £72 10s. 0d. to £72 12s. 6d.; settlement; £71 10s. 0d.

Zinc Sheets etc.—Sheets, 15g. and thicker, all English destinations, £108 15s. 0d., rolled zinc (boiler plates), all English destinations, £106 10s. 0d.; zinc oxide (Red Seal); d/d buyers' premises, £85 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes 1s. 9½d. per lb.; sheets to 10 w.g., 195s. 6d. per cwt.; wire, 2s. 8½d.; rolled metal, 195s. 6d. per cwt.

Brass (Brazing).—BS1400, SCB2, £176; SCB3, £172.

Brass (High Tensile).—BS1400, HTB1, £192; HTB2 £211; HTB3, £227.

Gunmetal.—BS1400, LG2, £209; LG3, £219; G1, 1½% £278; G1 ½% £293.

Phosphor Bronze.—BS1400, PB1 (AID released), £312; PB4 £298; BS1400, 90/10/1%, £299.

Leaded Phosphor Bronze.—BS1400, LPB1, £234.

Phosphor Bronze Strip, etc.—Strip, 300s. 3d. per cwt.; wire, 4s. 2d. per lb.; rods, 3s. 5d.; tubes, 3s. 5d.; chill cast bars, solids 3s. 5½d.; cored, 3s. 6½d. (CHARLES CLIFFORD LIMITED).

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 11½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 4½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 3½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 2½d. to 2s. 3d. per lb.; Antimony, English, 99 per cent., £230 0s. 0d. Quicksilver, ex-warehouse, £59 0s. 0d. Nickel, £660 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £238 AB2, £245.

Catalogues

Foundry Supplies. E. S. Lord, Limited, Eagle Oil Works, Bury Road, Rochdale, Lancs., have recently issued an illustrated booklet, which covers the wide and extensive range of foundry supplies, plant and equipment, which the company offers to the industry. The booklet is divided into three sections, the first covering corebinders, the second, plant, and the third miscellaneous foundry supplies. The catalogue is well set out and arranged and indexed for quick reference. Copies are available free of charge on application to the company.

Pyrometer Sheaths. In publication MRD 1, Morganite Research and Development, Limited, Battersea Church Road, London, S.W.11, cover three types of refractory sheaths, mostly for immersion application. They carry the trade name of Metamic with a qualifying number. It appears that No. 519 is suitable for use for temperatures up to 1,900 deg. C. whilst No. 612 is employed for a temperature range ending at 612 deg. C. The leaflet details the dimensions of the various types of sheaths available, together with other technical data.

Cranes. Paterson Hughes Engineering Company, Limited, Bedford House, Bedford Street, London, W.C.2, have issued as a separate publication, part 4 of their general catalogue, which describes a wide range of cranes, including both overhead electric travelling types and jib cranes. Most readers regard Paterson Hughes as a foundry-equipment firm, yet of the large number of illustrations of plant installed but two illustrate foundry applications. One of these shows a cupola-charging Telpher—a piece of equipment often to be found in iron foundries throughout the country. What, however, impressed the reviewer is the large number of industries served by this type of plant. The catalogue runs to 28 pages, is well laid out and lavishly illustrated.

Machine Mounting. Cementation (Muffelite), Limited, Hersham, Walton-on-Thames, Surrey, have issued a very well-produced catalogue covering the mounting of machine-tools and other plant so as to insulate them from receiving or communicating vibrations to other plant. It would be interesting to learn whether the company have experience with foundry moulding machines and with what results, for this indeed would be a severe test.

Silicon-carbide Denseners. In *Bulletin* No. 2, the Carborundum Company, Limited, Mull Lane, Rainford, St. Helens, Lancashire, describe and illustrate the results to be expected when using Carbofrax for densening the structure of cast iron. It is interesting to note the choice of the word "densener" as being technically more correct in this context than the alternative word "chill."

Dust Collection. Prat-Daniels (Stroud), Limited, Whitecroft, Nailsworth, Gloucestershire, have issued eight leaflets each dealing with some form of dust suppression in industry. From the foundry angle, No. P.42 is the most interesting, as it covers a wet-type collector for dust and sparks from cupolas. Another leaflet of interest to readers (P.47) is one dealing with an apparatus for smoke detection.

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SITUATIONS WANTED

S. O.S.—FOUNDRY FOREMAN, age 51, just redundant (ownership change), wants position immediately West Midlands. Fully practical, technical, ferrous, non-ferrous, CO_2, shell, hot box, sand, cupola control, jobbing or repetition. Apprenticeship served patterns foundry. Family man, excellent references, keen, reliable, conscientious. Commercial knowledge. Box SO218, FOUNDRY TRADE JOURNAL.

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FOUNDRY MANAGER (50), A.M.I.B.F., seeks a position, Lancashire and W.R. Yorkshire. Life experience in trade, machine tool castings up to 20 ton, jobbing, repetition, CO_2, ferrous, non-ferrous, practical, technical, commercial. Excellent references and results, hard-working, conscientious. Box FM187, FOUNDRY TRADE JOURNAL.

FOUNDRY METALLURGIST / ASSISTANT FOUNDRY MANAGER, aged 28, A.M.I.B.F., N.F.C. Diploma, seeks interesting progressive post. Experienced modern foundry methods, technical control and development. Box FM157, FOUNDRY TRADE JOURNAL.

WORKS CHIEF-CHEMIST, 37, fully conversant with complete analysis of pig-iron and allied materials, extensive foundry experience, holder of Ord.Nat.Cert. Metallurgy, A.M.I.B.F., and four subjects at L.I.M. level, including foundry-practice, desires suitable post in the Midlands. Box WC199, FOUNDRY TRADE JOURNAL.

YOUNG FOUNDRY METALLURGIST with five years in modern malleable foundry, and three years in research, seeks position in London or the London area preferred. Experience in cupola control, shell-moulding, CO_2 process, etc. Box YF196, FOUNDRY TRADE JOURNAL.

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FOUNDRY FOREMAN, preferably aged 25-40, for grey iron foundry. Practical experience and sound technical knowledge in CO_2 and greensand moulding essential. Good discipline and organising ability are important. WATTS ENGINEERING LTD., Macclesfield.

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He will be expected to work in close collaboration with the foundry manager and other foundry staff in the day to day duties.
Write giving full details of previous experience, practical and technical, age, and salary expected, to Box MC214, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

FOUNDRY METALLURGIST required. Applicants must have sound knowledge in the non-ferrous field, and will be required to carry out technical control in the foundry. Age 25 to 35. Salary in accordance with age and experience. Reply, giving full details to Box FM208, FOUNDRY TRADE JOURNAL.

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A SALES REPRESENTATIVE for a company selling steel castings is required in the East Lancashire-Yorkshire area; sales experience would be an advantage but a knowledge of foundry work is essential, and contacts in this industry would be a definite asset; remuneration by salary and commission; car provided; the successful candidate would be expected to live in the area, and must be willing to undergo a medical examination; preferred age 30-45. Apply, stating age, experience and qualifications to the PERSONNEL MANAGER, BLACK-CLAWSON INTERNATIONAL LTD., Westgate Works, Newport, Mon.

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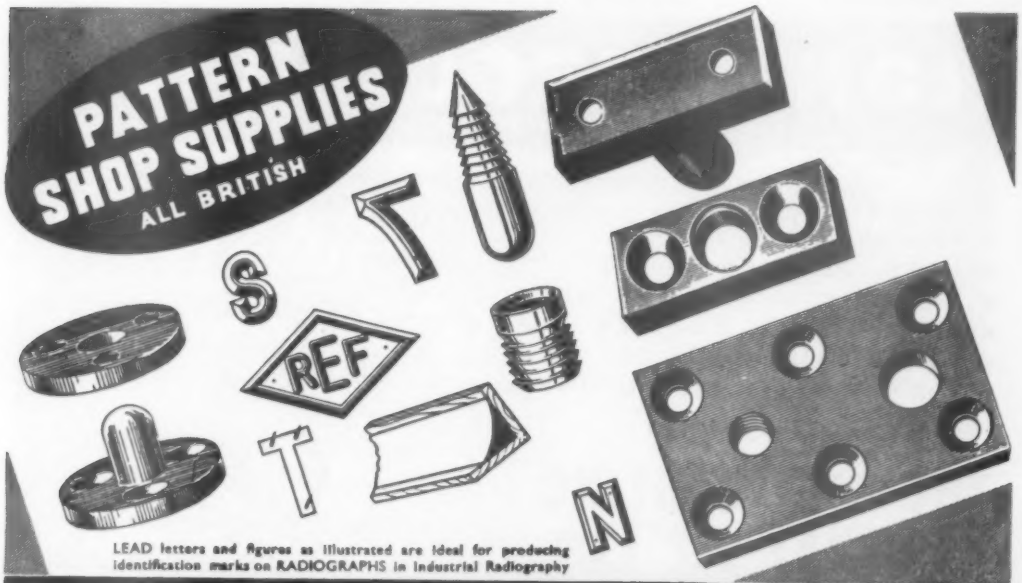

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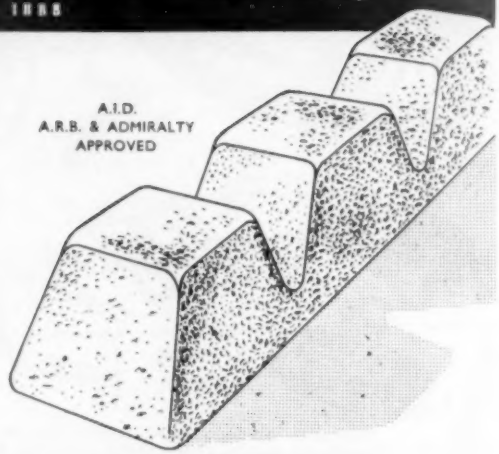

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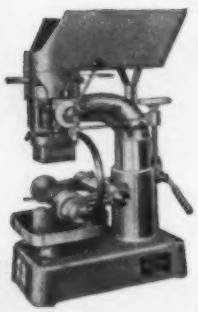

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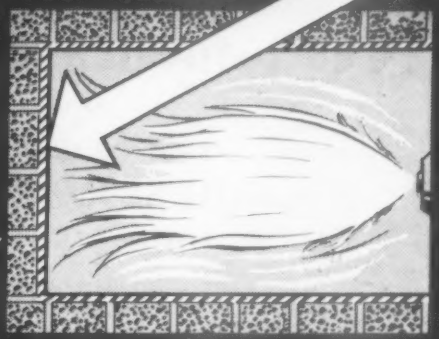

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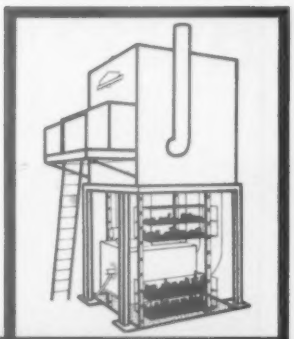

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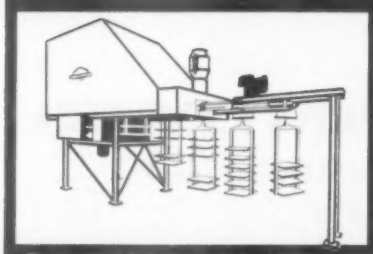

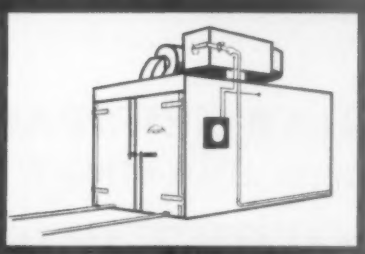

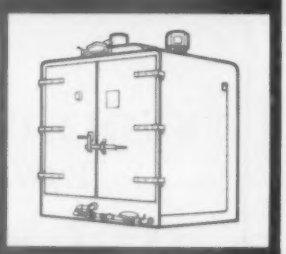

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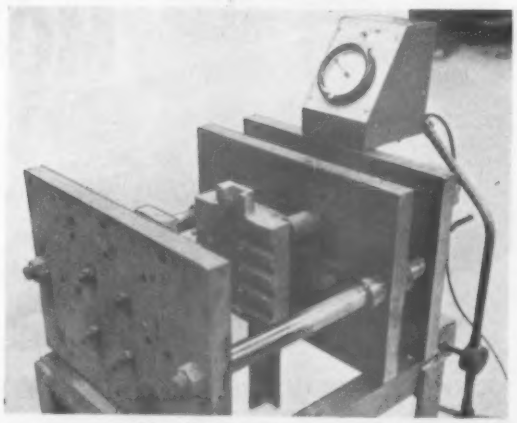

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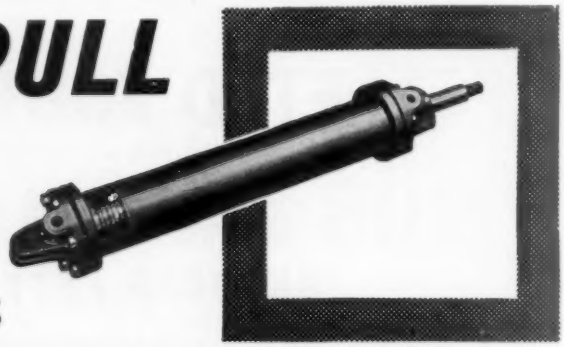

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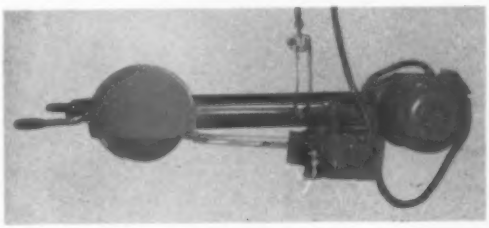

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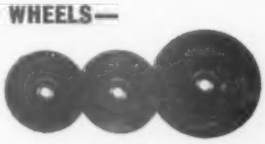

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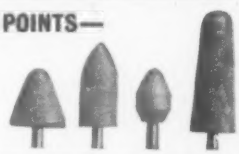

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